ESA/STAT/AC.190/Bk.5
28 August 2009

UNITED NATIONS
DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION

Meeting of the Expert Group on International Economic and Social Classifications
New York, 1-4 September 2009

Environmental Goods and Services Sector

Extract of the manual prepared by the
Eurostat Task Force on the Environmental Goods and Services Sector

THE ENVIRONMENTAL GOODS AND SERVICES SECTOR

A DATA COLLECTION HANDBOOK

Chapters 2,3 and 4 for editor of the SEEA-rev

CHAPTER 2

The Environmental Goods and Services Sector

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1. The Environmental Goods and Services Sector

This chapter lays down the general concepts related to the Environmental Goods and Services Sector (EGSS, eco-industry or environmental sector thereafter) placing them into the wider context of the European System for the Collection of Economic Data on the Environment[1] (SERIEE) and of the System of Integrated Environmental and Economic Accounting[2] (SEEA). The chapter starts with a general definition of the environmental sector. It presents the delimitation of the sector for statistical purposes, the activities to be measured and the producers to be taken into account. The chapter provides also a classification of the sector according to the environmental domains. Finally, the annexes provide detailed definitions, examples and practical recommendations.

1.1. Overview of the environmental sector

The OECD/Eurostat manual as starting-point

This handbook uses as a starting-point the definition of environment-related activities of the Environmental Industry OECD/Eurostat manual[3]. Environment-related activities are "activities to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes cleaner technologies, goods and services that reduce environmental risk and minimise pollution and resource use". The environmental sector can therefore be described as follows:

Definition of the EGSS

The **Environmental Goods and Services Sector** consists in an heterogeneous set of producers of technologies[4], goods and services that:

- measure, control, restore, prevent, treat, minimise, research and sensitize to environmental damages to air, water and soil as well as problems related to waste, noise, biodiversity and landscapes. This includes "cleaner" technologies, goods and services that prevent or minimise pollution.

- measure, control, restore, prevent, minimise, research and sensitize to resources depletion. This results mainly in resource-efficient technologies, goods and services that minimise the use of natural resources[5].

These technologies and products (i.e. goods and services) must satisfy the end purpose criterion, i.e. they must have an environmental protection or Resources Management purpose (thereafter "environmental purpose") as their prime objective.

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[1] Eurostat, 1994, "SERIEE manual: European System for the Collection of Economic Data on the Environment".
[2] UN, Eurostat, OECD, IMF, WB, 2003, "System of integrated Environmental and Economic Accounting: SEEA".
[3] OECD/Eurostat, 1999, "The environmental goods and services industry: manual for data collection and analysis".
[4] Broadly speaking technology refers to the body of know-how about the means and methods of producing goods and services. This includes methods of organisation as well as physical technique. The OECD gives the following definition: "technology refers to the state of knowledge concerning ways of converting resources into outputs. Technological innovations comprise new products and processes and significant technological changes of products and processes. An innovation has been implemented if it has been introduced on the market (product innovation)". OECD Productivity Manual: A Guide to the Measurement of Industry-Level and Aggregate Productivity Growth, OECD, Paris, March 2001, Annex 1 – Glossary.
[5] Natural resources are physical inputs, both renewable and non-renewable that can potentially be withdrawn from the natural environment. Natural resources are those elements of the environment that provide use benefits through the provision of materials used in economic activities (e.g. fossil energy, raw materials or water); or that may provide such benefits one day, and that are subject to quantitative depletion through human use. UN, Eurostat, OECD, IMF, WB, 2003, "System of integrated Environmental and Economic Accounting: SEEA", http://unstats.un.org/unsd/envAccounting/seea2003.pdf.

Following the nomenclature used in the SERIEE and SEEA, environmental technologies and products comprise environmental specific services, connected products, adapted goods, end-of-pipe technologies and integrated technologies.

Following the SERIEE, the SEEA and the Environmental Industry OECD/Eurostat Manual, these environmental technologies and products can be classified in two main groups:

Classification of environmental technologies and products

- **Environmental Protection (EP),** which includes technologies and products of both a preventive or remedial nature for the prevention, reduction, elimination and treatment of air emissions, waste and wastewater, soil and groundwater contamination, noise and vibration as well as radiation, the prevention, reduction and elimination of soil erosion and salinity as well as other kinds of degradation, the preservation of biodiversity and landscapes as well as the monitoring and control of the quality of the environmental media and waste[6].

- **Resource Management (RM),** which comprises technologies and products to manage and/or conserve the stock of natural resources against depletion phenomena including both preventive and restoration activities as well as the monitoring and control of the levels and uses of natural resource stocks.

Both groups include administrative activities, education, training, information and communication activities as well as research and development activities.

The producers of the EGSS: the General Government and the corporations

The environmental sector is highly diverse. It includes activities carried out by the General Government and by Corporations, ranging from, for example, manufacturing enterprises to consultants, from public administration to educational institutions.

Principal, secondary and ancillary activities

Furthermore, the production of environmental technologies, goods and services can be either a principal or secondary activity. It can also be carried out for own internal use, i.e. be an ancillary activity.

[6] Adapted from definitions of SBS Regulation variables and definitions of CEPA 2000 classes and categories.

1.2. Delimitation of EGSS

1.2.1. What is included and excluded in the environmental sector ?

What is provided by the environmental sector?

The environmental sector includes the provision of environmental technologies, goods and services for every kind of use, i.e. intermediate[7] and final consumption[8] as well as gross capital formation[9].

What are the technologies, goods and services to measure?

For statistical purposes, only technologies, goods and services that have been *produced for* the environment ("environmental purpose") are included in the scope of the environmental sector.

What does it mean environmental purpose?

Environmental purpose means that the technology, good or service has been produced for:

- preventing or minimising pollution, degradation or natural resources depletion;
- reducing, eliminating, treating and managing pollution, degradation and natural resources depletion or restoring environmental damages to air, water, waste, noise, biodiversity and landscapes;
- carrying out other activities such as measurement and monitoring, control, research and development, education, training, information and communication related to Environmental Protection and/or Resource Management.

The environmental purpose: technical nature of the activity and producer's intention

In order to define whether a technology, good or a service is part of the EGSS, the environmental purpose must be the "main purpose". This is identified mainly on the basis of the technical nature of the activity or the producer's intention, i.e. regardless of the intention of the users.

For example, this criterion leads to the inclusion of the specialised producers of waste management services even though they do not have actually the intention to protect the environment. Waste management is included in the scope because the activity complies with the reference definition from a technical point of view: it removes waste from the environment.

The selection criterion based on the producer's intention should however be applied for handling particular/boundary cases (cases that are not already solved according to above criteria).

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[7] Intermediate consumption consists of the value of the goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital; the goods or services may be either transformed or used up by the production process. (http://stats.oecd.org/glossary/)

[8] Final consumption consists of goods and services used up by individual households or the community to satisfy their individual or collective needs or wants. (http://stats.oecd.org/glossary/)

[9] Gross capital formation is measured by the total value of the gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables for a unit or sector. Gross fixed capital formation is measured by the total value of a producer's acquisitions, less disposals, of fixed assets during the accounting period plus certain additions to the value of non- produced assets (such as subsoil assets or major improvements in the quantity, quality or productivity of land) realised by the productive activity of institutional units. (http://stats.oecd.org/glossary/)

In practice, producer's intention means:

- the awareness of the producer about the environment-friendly characteristics of its output;
- the awareness of the producer about the use of its output;
- the environment-related markets to which the producer addresses its output.

This is the case of producers of renewable energy technologies, clean cars or eco-efficient devices.

The user's purpose is, on the contrary, never to be used in the EGSS context.

What is not included in the sector?

All technologies, goods and services whose main purpose (according to the technical nature or the producer's intention) is not an environmental purpose are not included in the EGSS even if the technology or product has a favourable impact on the environment. An example is the electronic delivery of documents. This is a service that substitutes printing and physical delivery and thereby provides major savings in paper and energy for transport and helps to minimise resources use. However it has not been provided mainly for environmental purposes.

Hence, excluded from the EGSS are activities that, while beneficial to the environment, primarily satisfy technical, human and economic needs or requirements for health and safety.

Natural hazards and risks management

Activities related to natural hazards and natural risk management, aiming mainly to prevent or reduce the impact of natural disasters on human health are not included in the EGSS.

NOTE: Although natural hazards and natural risk management activities were included in the environmental sector by the Environmental Industry OECD/Eurostat manual, they are excluded from the scope of the EGSS by this handbook. In fact natural risk management activities aim mainly at preventing or reducing the impact of natural disasters like storms or volcanic eruptions on human activities. Of course nature is affected by these disasters too but humankind is the main concern of natural risk management activities.

However, some kind of activities, such as the protection of soil against erosion which reduce the risk of landslides and floods are included in the EGSS, because their primary aim is the protection of soil.

Extraction, mobilisation and exploitation of non-renewable resources

The technologies, goods and services produced to extract, mobilise and exploit non-renewable[10] resources are not included in the EGSS. These are technologies, goods and services that use resource stocks whereas the EGSS is concerned with preventing or reducing resources depletion only.

[10] A non-renewable resource is a natural resource that exists in a fixed amount that cannot be re-made, re-grown or regenerated as fast as it is consumed and used up (adapted from SEEA 2003). Some non-renewable resources can be renewable but take an extremely long time to renew. Fossil fuels, for example, take millions of years to form and so are not considered 'renewable'.

1.2.2. What kind of environmental technologies, goods and services?

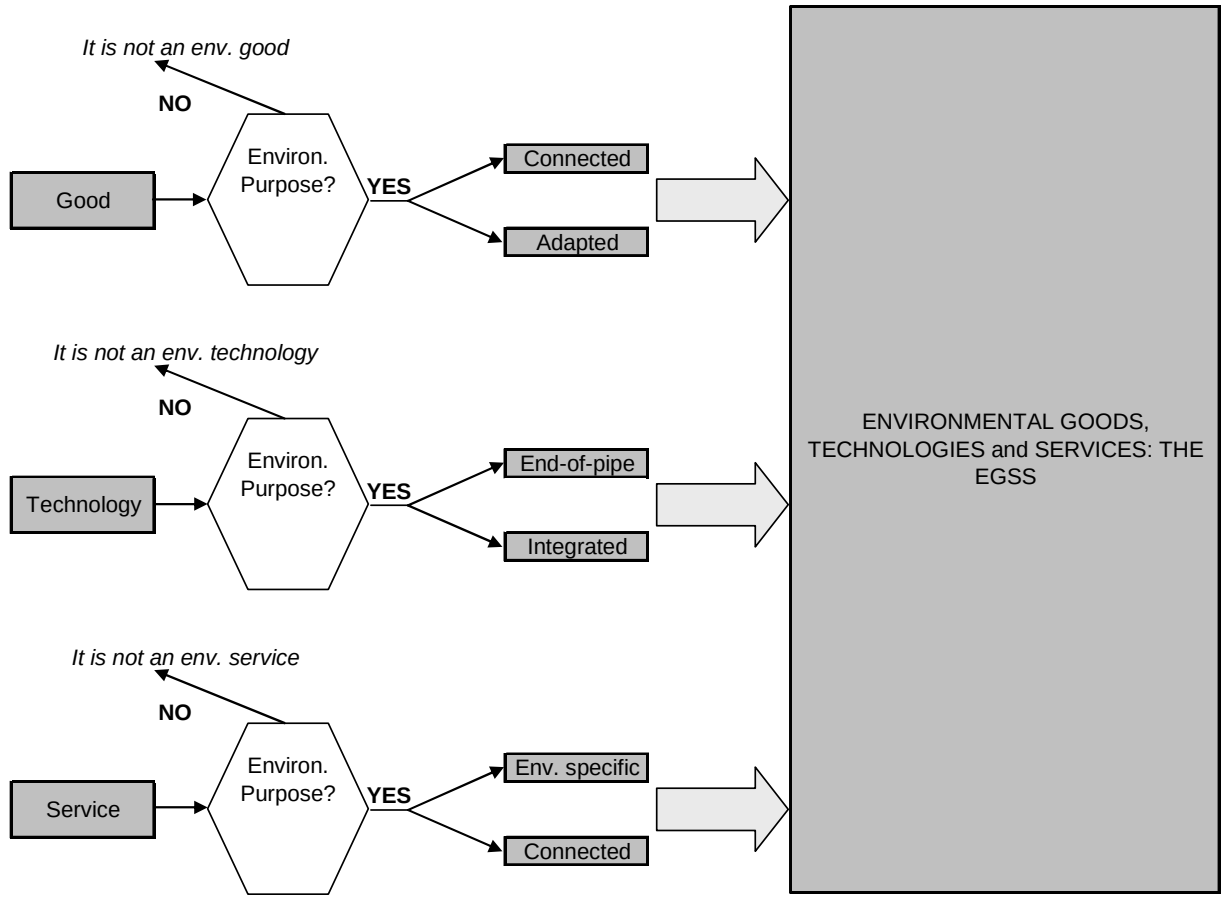

Figure 2.1 : Environmental technologies, goods and services within the scope of the EGSS

Which kind of environmental technologies and products

The technologies, goods and services produced in the EGSS are classified according to their function and characteristics as described in the Figure 2.1. Detailed examples of environmental technologies, goods and services are provided in Annex 2.

Technologies, goods and services produced by the EGSS can be classified in environmental "specific" services, connected products (goods and services), adapted goods, integrated technologies and end-of-pipe technologies[11].

Environmental specific services

- **Environmental "specific" services**[12] consists of the output of Environmental Protection or Resource Management "characteristic" activities. Characteristic activities are, according to SNA, those "typical for the field under study". In the case of the EGSS, according to the SERIEE, characteristic activities are activities whose purpose is an environmental purpose[13].

[11] See also SERIEE § 10031.
[12] The concept of "Specific services" is defined in SNA93 §§ 21.61-21.62; SERIEE §§ 2010-2023.
[13] See SERIEE § 2009-2014.

Environmental "specific" services can be divided in:

- Environmental Protection (EP) services, whose purpose can be: pollution or degradation prevention, reduction / treatment / elimination, measurement, administration, education, etc. *Examples are* waste management and wastewater management activities.

- Resource Management (RM) services, whose purpose can be natural resource depletion prevention, reduction, measurement, administration, education, etc. *Examples are* activities for the reduction of water leaks and losses, energy and water saving activities.

Connected products

- **Connected products** may be services or goods (durable or non-durable goods)[14]. According to the SNA, connected products are "clearly covered by the concept of the field under study, without being typical, either by nature or because they are classified in broader categories of products". In the case of the EGSS, a connected product directly serves and has no use except for Environmental Protection or Resource Management.

  Connected products can be divided into:

  - EP services such as, *for example,* maintenance services for septic tanks.

  - RM services such as, *for example*, installation of renewable energy production technologies.

  - Goods for the provision of EP services such as trash bags, septic tanks, equipment aimed at monitoring and controlling the concentration of pollutants in wastewater as well as filters to capture air particles and all components that are used specifically and exclusively for environmental protection technologies.

  - Goods for the reduction of resources use or the provision of RM services such as equipment aimed at monitoring and controlling the level of groundwater (e.g. water-table) and all components that are used specifically and exclusively for Resource Management technologies.

Connected products vs the output of characteristic activities

It should be noted that products are considered as connected when they serve a specific function even though they are not the output of the activities characteristic of the function. *For example*, the adjustment of exhaust pipe can be carried out for several reasons such as ordinary maintenance. Thus in general these services do not belong to the function "protection of the environment". When these services are carried out exclusively for reducing air emissions they are considered as connected.

Installation of environmental technologies (end-of-pipe or integrated technologies) is to be considered a connected service when the installator is

[14] The concept of "Connected products" can be found in SNA93 §§ 21.61-21.62; SERIEE §§ 2024-2034.

specialised (i.e. most of its turnover comes from the installation of technologies). *An example* is the installator who mainly installs solar pannels.

Adapted Goods

- **Adapted goods**[15] are goods which are less pollutant or more resource efficient than equivalent normal goods which furnish similar utility[16]. Their primary use is not an EP or RM one. Adapted goods can be divided into:

  - "cleaner" goods, which contribute to prevent pollution or environmental degradation because they are are less pollutant at the time of their consumption and/or scrapping compared to equivalent "normal" goods. *Examples are* mercury-free batteries, cars or buses with lower air emissions and silent asphalt;

  - "resource efficient" goods, which contribute to prevent natural resource depletion because they have less content of natural resource inputs in the production stage (*for example*, recycled paper and renewable energy, heat from heat pumps and solar panels, energy and heat from combined heat and power) and/or in the use stage (*for example*, resource efficient appliances, saving-water devices such as tap filters or differentiated systems for flushing the toilet, desalinated water).

  Adapted goods can be durable and non-durable goods. They can be purchased for intermediate and final consumption, as well as for capital formation. *Examples are* biodegradable soaps, ecological paints, cleaner cars, efficient refrigerators and washing machines, etc. They may be the result of the reformulation or re-design of existing goods for the explicit purpose of reducing the output of pollutants or minimising the use of resources. They may also be the result of the production of new goods whose purpose is dual, both satisfy consumers' needs and for pollution prevention or resource efficiency.

Adapted goods and the environmental purpose

Adapted goods differ from specific services and connected products due to the fact that while the latter have no use except for environmental protection or Resource Management, the former do not have an environmental protection or Resource Management primary use. According to SERIEE, goods have to be considered as "adapted" if, on the basis of their technical nature, they comply with the following criteria:

- are less pollutant at the time of their consumption and/or scrapping, than equivalent normal products (Environmental Protection adapted goods)

- have less content of natural resource inputs in the production stage and/or in the use stage (Resource Management adapted goods).

The definition of adapted goods is based on technical characteristics of goods. According to this definition there may be often the case that

[15] The concept of adapted goods can be found in SERIEE §§ 2024-2034.

[16] Adapted goods are more costly and an estimation of the environmental share or extra cost is undertaken in the EPEA accounts. In the EGSS statistics, the requirement of being more costly than equivalent normal goods should not be taken into account and the total amount of turnover, value added, employment and exports is to be taken and not only an environmental share.

adapted products are used as intermediate consumption and are incorporated in other (thereby also adapted) products (SERIEE § 2031). *For example*, recycled row paper and book printed on recycled paper are to be considered both adapted goods. *Another example* is the use of CFC-free foams for refrigerators. In this case either the CFC-free foams (for that part incorporated in the refrigerators) and the refrigerators are adapted goods.

Adapted goods and the environmental share

Due to the peculiarity of adapted goods (their primary use is not environmental and one can find an adapted good for almost all goods of the market), SERIEE recommends not to include in statistics the total amount of economic aggregates related to adapted goods, but only an "environmental share" which can be measured by the extra cost[17] of the adapted good compared to its equivalent normal good.

Since the purpose of producing statistics on EGSS is to measure the size of the sector and the related market, in order to quantify the turnover, value added, employment and exports generated by the production of adapted goods, the total figures should be included and not the environmental share calculated when comparing the adapted good with its equivalent normal good. As a consequence of this, special attention should be paid when comparing and using data produced for EGSS statistics together with data coming from SERIEE expenditure accounts.

- **Environmental technologies** are technical processes, installations and equipments (goods) and methods or knowledge (services) whose technical nature or purpose is environmental. Environmental technologies can be classified in:

End-of-pipe technologies

  - **end-of-pipe technologies** which are mainly technical installations and equipments produced for measurement, control, treatment and restoration/correction of pollution, environmental degradation and resources depletion. These installations and equipments operate independently of or are identifiable parts added to the production and end-life consumption cycles. For example, they treat pollution that has been generated or resources that have already been withdrawn or measure the level of pollution or resources use (monitoring)[18].

    End-of-pipe technologies can be produced for:

    - the pollution or degradation treatment / reduction / elimination after its generation;

    - the natural resource depletion reduction by reducing the withdrawals of natural resources downstream through systems for the reuse or recycling of materials (i.e. the same output with same input, but consisting in recovered materials).

[17] To assess extra cost, adapted and equivalent normal products should be compared at the level of their cost of production excluding any taxes on products and excluding any subsidies on products or on production, i.e. prior to subsidies to producers or fiscal incentive measures for consumers.

[18] Adapted from the definitions of SBS Regulation variables (21 11 0)

Thus, the facilities for environmental specific services (e.g. wastewater or waste treatment facilities), filters, incinerators, as well as equipments for recovery of materials etc, are end-of-pipe technologies.

Integrated technologies

- **integrated technologies** are technical processes, methods or knowledge used in production processes less pollutant and resource intensive than the equivalent average technology used by national producers. Their use is less environmentally harmful than relevant alternatives.

Integrated technologies can be:

- "cleaner" technologies, whose purpose is pollution or degradation prevention;
- "resource efficient" technologies whose purpose is natural resource depletion prevention by reducing the withdrawals of natural resources upstream (i.e. to obtain the same output with less natural resource input).

For example, in the manufacturing industry, "cleaner" technologies are those that result in the most eco-efficient industrial processes (e.g. dry ovens compared to wet ovens in cement manufacture).

In the agriculture sector cleaner technologies are those that reduce and minimise the negative impacts of the agriculture on soil quality (e.g. organic farming[19]).

In the energy production sector resource efficient technologies are those that allow the production of renewable energy such as windmills, solar panels, hydroelectric turbines, combined heat and power, etc.

Integrated technologies are thus mainly methods, practices and equipments typically integrated in the production cycle. Their environmental benefits arise during the production process.

They may be the result of the modification of existing equipment/method/practice for the explicit purpose of reducing the output of pollutants or minimising the use of resources during their direct use in the production processes. They may also be the result of the production of new equipment or the application of new methods and practices whose purpose is dual, both pollution prevention or resource efficiency and productivity gains.

Integrated technologies decrease material inputs, reduce energy consumption, minimise waste and/or reduce emissions compared to the national current standard.

[19] Organic farming is an integrated technology, i.e. a best practice method used in the production process. But for practical reasons (to be able to measure the turnover, value added and exports of organic farming goods), it has been agreed upon to classify variables of organic farming as adapted goods (they are less polluting in the production stage, thus they do not fall in the definition of adapted goods) instead of as an integrated technology.

In general, end-of-pipe technologies, connected goods and some environmental specific services act after pollution or degradation has been generated or natural resources have been withdrawn: they do not prevent or reduce pollution and resource depletion upstream, but just treat, face and manage these phenomena after they have occurred.

On the contrary, integrated technologies, adapted goods and some other environmental specific services prevent and reduce pollution or degradation and natural resources depletion upstream.

The environmental share of integrated technologies

As in the case of adapted products, SERIEE recommends not to account for entirely the figures related to integrated technologies, but only to assess the environmental share on the basis of their extra-cost compared to normal equivalent equipments[20]. Since statistics on the EGSS should allow to measure the turnover, value added, employment and exports generated by the production of integrated technologies, the total figures should be included. Also in this case, therefore, special attention should be paid when comparing and using data produced for EGSS statistics together with data coming from the SERIEE expenditure accounts.

National standard and national market

To identify integrated technologies and adapted goods, it is necessary to find an alternative for comparison. This alternative corresponds to the average alternative available in the national market which furnishes similar utility and has similar functions and characteristics in all respects except for those relating to environmental protection or natural resources preservation. Methods and examples of how to identify the alternative for comparison are presented in Chapter 3.

The Figure 2.2 below resumes the nomenclature used in this handbook to differentiate the environmental technologies, goods and services.

[20] "There is no clear-cut theoretical difference between adapted capital products and integrated equipment. There are practical differences however. Integrated equipment is typically specific for single producers or industries in its technical specifications and extra cost can be assessed most easily by the producers employing the equipment. Adapted capital products and adapted as well as connected products in general are typically used in many or all industries and in the households sector. Extra cost as well as the use of adapted products can be most easily assessed from the outside" (SERIEE § 2034). The 2005 Eurostat "Environmental expenditure statistics: Industry data collection handbook" provides examples of integrated technologies and criteria for assessing their environmental share.

		Environmental Protection	Resource Management
Technologies	*Integrated* → Cleaner	X	
	Integrated → Resource-efficient		X
	End-of-pipe	X	X
Goods	*Adapted* → Cleaner	X	
	Adapted → Resource-efficient		X
	Connected	X	X
Services	*Environmental specific*	X	X
	Connected	X	X

Figure 2.2 : Nomenclature of the environmental technologies, goods and services

1.2.3. Producers and activities

Every sector of the EGSS is characterized by an input of technologies, goods and services, a production process and an output of technologies, goods and services; in other words, EGSS activities are "economic" activities like all activities listed in the international classification ISIC[21] and NACE[22].

In the supply chain of environmental technologies, goods and services, selection criteria are needed to distinguish production activities belonging to the environmental sector from those which belong to other activities of the business. Within this chain, there are suppliers of components for environmental technologies and products, main producers and distributors.

Which part of the production chain should be considered in the scope of the EGSS?

For statistical purposes, only producers that are producing the final environmental technology, good or service, i.e. the main producers, are included as making part of the EGSS. Excluded are the producers that are providing components of an environmental technology or product to the main producer when these components are not for being used exclusively in environmental technologies. Excluded are also the activities selling the already produced goods to final consumers (the distributors of the final good). This means that the suppliers of non exclusively environmental components and the distributors of environmental technologies and products are not part of the EGSS.

Installation and construction of environmental technologies and products are producers of the EGSS

Installation activities are part of the EGSS as producers of connected services only if they are specialised in installation of environmental technologies and products.

Construction activities are part of the EGSS *for example* in the case of construction of facilities for environmental specific services (in this case construction activities are producers of end-of-pipe technologies) or in the case they are specialised in the construction of adapted goods (e.g. the construction of passive/energy efficient buildings, in this case construction activities are producers of adapted goods).

Which are the producers and which kind of activities to measure?

The environmental sector is composed by two types of producers: General Government and corporations.

[21] ISIC is the United Nations International Standard Industrial Classification of All Economic Activities. This classification is the international standard for the classification of productive economic activities. The main purpose is to provide a standard set of economic activities so that entities can be classified according to the activity they carry out.

[22] Nomenclature generale des Activites Economiques dans les Communautes Europeennes (NACE) refers to the industrial classification as it is used by Eurostat. http://circa.europa.eu/irc/dsis/nacecpacon/info/data/en/index.htm

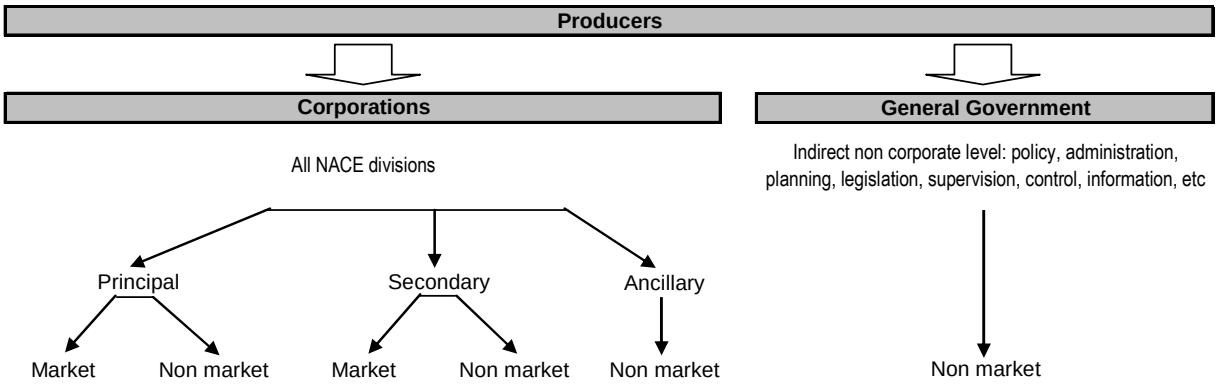

Figure 2.3 : Classification of producers

The General Government

The **General Government**[23] is here defined as central, regional and local governments, authorities, communities and government agencies concerning legislation, supervision, control, information, etc. This relates to production of public services, provided to the users more or less free of charge and financed mainly from the government budget. Excluded are government-owned entities that conduct market operations, such as public enterprises.

The statistical units for the collection and compilation of statistics on General Government recommended by this handbook are:

- Central government: this sector comprises all administrative departments of the central state and other central agencies whose competence extends over the entire economic territory, except for the administration of social security funds.
- Regional governments: this sector comprises separate institutional units exercising some of the functions of government (excluding the administration of social security funds) at a level below that of the central government and above that of the local government.
- Local governments: this sector comprises public authorities and/or bodies, excluding social security funds' local agencies, whose competences extend only to a local area of the country's economic territory.

Examples of General Government EGSS activities are agencies and all the public authorities or departments that carry out regulatory, administrative or control activities in the field of the Environmental Protection or natural Resource Management; For example, biodiversity, forest, agriculture and energy public agencies belong to the sector.

Government owned waste and wastewater treatment services are classified in the corporations' sector.

The definition of the General Government in the EGSS excludes government owned and controlled non-market units, known as public corporations, such as

[23] The ESA 95 gives the definition of the different levels of government. The General Government sector is divided into four sub-sectors, i.e. central, state, and local government as well as social security funds.

waste and wastewater treatment services. Such units are classified in the corporations' sector[24].

Corporations

In this handbook, **corporations** refer to the activities considered in the NACE rev. 2 classes A to Q.

The recommended statistical unit for the collection and compilation of statistics on the corporations is the local kind-of activity unit (local KAU) which corresponds to a local unit. According to the European System of Accounts (ESA) the local KAU is called the establishment in the System of National Accounts (SNA)[25].

The activities of the corporations can be sorted out according to different criteria. The handbook distinguishes between market and non-market, principal, secondary and ancillary activities.

Market/ non-market activities

Activities can be market or non-market, according to the percentage of the production costs covered by the price used for the sale of the product or technology. According to the ESA 95,

Market activities permit to sell a technology/product at a price that is economically significant, namely that the sale covers more than 50 percent of the production costs. The price considered is the price not including Value Added Tax or subsidies.

Examples of market activities are all types of enterprises of profit seeking ventures.

Non-market activities provide technologies or products freely or at an economically non-significant price.

Examples of non-market activities are the waste management or wastewater management traditionally carried out by enterprises under the control of the government.

Principal and secondary activities

Moreover the ESA 95 qualifies activities as principal or secondary according to the revenue they provide to their producer.

Principal activities are the activities that produce most of the revenue of the unit under consideration.

Secondary activities are the activities that produce smaller quantities of other technologies and products in addition to principal activity that are destined to be used by other units.

Which criteria can be used to identify principal and secondary activities?

The distinction between principal and secondary activities is based on the related share of the gross value added (GVA): the principal activity is the activity producing the most part of the value added. If no value-added figures are available, other criteria must be used, such as, for example, employment, payroll, turnover and assets, with a view to obtain the closest possible approximation of the distinction that would have been obtained on the basis of value added. Thus,

[24] According to the 2002 Eurostat Compilation guide on the EPEA, these General Government units carrying out Environmental Protection services are considered specialised producers. In the EGSS, they are considered as public corporations undertaking non market activities.
[25] Council Regulation (EEC), No. 696/93, Section III G of 15.03.1993 on the statistical units for the observation and analysis of the production system in the Community and ESA 2.106, footnote 15.

for non-market producers, the principal activity is the one that accounts for most of the costs of production. This does not necessarily imply that this activity accounts for 50% or more of the entity's total value added.

Ancillary activities

When the beneficiary of the activities is the producer himself, the activity is said to be ancillary.

> **Ancillary activities** result in technologies or products that are retained for use other than capital formation in the same unit. Thus, ancillary activities are those that exist solely to support the main productive activities of an entity by providing goods or services for the use of that entity.

NOTE: following the NACE 2 Introductory Guidelines, the auto production of (renewable) energy should not be accounted as an ancillary activity. Since the auto production of renewable energy is one of the most significant activities for Resource Management in some industrial sectors (mainly in the food industry and the paper industry), it should be recorded as an ancillary activity in the Standard Tables for the EGSS.

Examples of environmental ancillary activities are then in-house waste collection and treatment, own wastewater treatment plants, education and training and other general administration, production of renewable energy for own consumption/use, etc.

Detailed definitions of principal, secondary and ancillary activities are given in more details in Annex 1.

1.3. Classification of the environmental sector

How to classify environmental technologies, goods and services?

Environmental technologies, goods and services can be classified in two categories: the Environmental Protection and the Resources Management[26], as described in Figure 2.4.

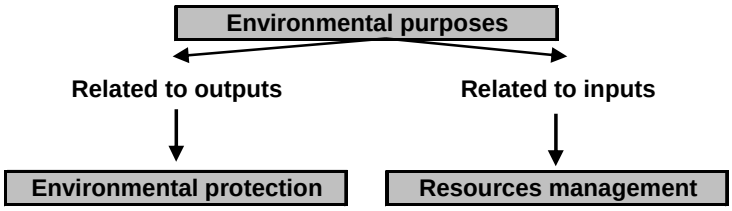

Figure 2.4 : Classification of environmental technologies and products by category

Environmental Protection includes technologies, goods and services of both a preventive or remedial nature such as for the reduction, prevention or treatment of waste and wastewater, the prevention, elimination or reduction of air emissions, the treatment and disposal of contaminated soil and groundwater, the prevention or reduction of noise and vibration levels, the preservation of ecological entities and landscapes, the monitoring of the quality of the environmental media as well as the research and development (R&D), the general administration and training and teaching activities oriented towards Environmental Protection.

Resource Management includes technologies, goods and services to manage and/or conserve natural resources. Technologies and products related to the reuse and recycling, the increase/recharge of stocks, the restoration of depleted resources or regulation, measurement and control are also included in this category.

Which natural resources?

The natural resources considered in this handbook are those scoped by SERIEE, i.e. the non-produced natural assets whose use takes the form of goods. Hence, livestock, plants, etc. as well as the environmental services which results from uses of certain functions of natural assets (aesthetic value, etc.) are excluded. Natural resources consist therefore of inland waters, natural forests, wild flora and fauna and subsoil reserves (fossil energy and minerals)[27].

Distinction between Environmental Protection and Resource Management

The main distinction between Environmental Protection and Resource Management is that the Environmental Protection covers technologies, goods and services specifically related to protecting the environment from the harmful effects of socio-economic activities, by preventing, reducing pollution and

[26] The structure of the European System for the Collection of Economic Data on the Environment (SERIEE) can help in identifying the environmental activities. SERIEE comprises two satellite accounts. The first is the Environmental Protection Expenditure Account (EPEA), which aims at the description of measures and related expenditures carried out to protect the environment against pollution and degradation phenomena (qualitative perspective). The second is Natural Resource Use and Management Expenditure Account (RUMEA), devoted to the description of measures and related expenditures carried out to manage and save the stock of natural resources against depletion phenomena (quantitative perspective).

[27] SERIEE, 1994, Chapter X, § 10043-45.

degradation phenomena or restoring and repairing damage where it occurs. Resource Management covers technologies, goods and services reducing the need and use of non-renewable resources. Resource Management activities may also result in associated, secondary, environmental benefits such as protection and restoration of wildlife and natural habitats[28].

Thus, Environmental Protection focuses on physical outputs, while Resource Management focuses on inputs (natural resources).

Classification according to environmental domains

All the technologies, goods and services of the EGSS can be classified according to the environmental domain where damage is prevented, reduced or treated and/or according to the resource whose use is minimised. Environmental protection activities are carried out, among others, in the air, water, waste or noise domains and Resource Management activities deal with, among others, water, energy and minerals.

The category of Environmental Protection activities can be split in environmental domains using the Classification of Environmental Protection Activities (CEPA 2000).

Activities belonging to the Resource Management category can be split according to the natural resources affected and classified according to a Classification of Resource Management Activities (CReMA 2008).

In the following paragraphs, the handbook presents the two classifications. Practical guidance on the way to use them in some special cases, e.g. activities which can be classified in two or more domains is presented in chapter 3.

The Environmental Protection activities classified by CEPA

The Classification of Environmental Protection Activities (CEPA) as recommended by SERIEE is composed of 9 classes whose content is detailed in Annex 2. The general structure is as follows:

1: Protection of ambient air and climate

2: Wastewater management

3: Waste management

4: Protection and remediation of soil, groundwater and surface water

5: Noise and vibration abatement

6: Protection of biodiversity and landscape

7: Protection against radiation

8: Research and development

9: Other Environmental Protection activities

No international agreed standard classification for Resource Management activities exists yet. A classification for the natural Resource Management

[28] SEEA, 2003, p. 76, http://unstats.un.org/unsd/envAccounting/seea2003.pdf

category is nevertheless proposed in this handbook even if it is conceived as a temporary classification as an official one is waited for[29].

The classification of Resource Management activities

The Classification of Resource Management Activities (CReMA) described hereafter is the result of discussions at a European level and is seen as a step ahead with respect to the OECD/Eurostat 1999 manual.

This preliminary classification includes 7 classes. Their content is detailed in Annex 2. The structure is as follows:

- 10: Management of waters
- 11: Management of forest resources
  - 11 A: Management of forest areas
  - 11 B: Minimisation of the intake of forest resources
- 12: Management of wild flora and fauna
- 13: Management of energy resources
  - 13 A: Production of energy from renewable sources
  - 13 B: Heat/Energy saving and management
  - 13 C: Minimisation of the intake of fossil resources as raw material for other use than energy production
- 14: Management of minerals
- 15: Research and development
- 16: Other natural Resource Management activities

The correspondence between the classification of EGSS of this handbook and the one used by the OECD/ Eurostat manual is presented in Annex 3.

Examples, recommendations and more details on the classification by environmental domains are presented in Annex 2 and in Chapter 3.

[29] The London Group, an informal group of experts from international institutions but also from national statistical organisations, is currently discussing the adoption of a general classification of resource use and management activities. The CReMA is a subset of this classification. See http://unstats.un.org/unsd/envaccounting/londongroup/

Annex 1. Details on goods/services/technologies, the General Government and principal/secondary/ancillary activities

Goods, services and technologies

Goods are physical objects for which a demand exists, over which ownership rights can be established and whose ownership can be transferred from one institutional unit to another by engaging in transactions on markets.

Services are outputs produced to order and which cannot be traded separately from their production. Services are not separate entities over which ownership rights can be established. Services are heterogeneous outputs and typically consist of changes in the conditions of the consuming units realized by the activities of producers at the demand of the consumers. By the time their production is completed they must have been provided to the consumers. It is also possible for a unit to produce a service for its own consumption provided that the type of activity is such that another unit could have carried it out[30].

Broadly speaking, technology refers to the body of know-how about the means and methods of producing technologies and products. This includes methods of organisation as well as physical techniques. The OECD gives the following definition: **Technology** refers to the state of knowledge concerning ways of converting resources into outputs. Technological innovations comprise new products and processes and significant technological changes of products and processes. An innovation has been implemented if it has been introduced on the market (product innovation)[31].

General Government versus corporations

In order to establish whether a producer belongs to the General Government sector or to other sectors three main classification criteria can be applied, i.e. the possible autonomy of decision, the kind of ownership (private or public), and the kind of output (market or non-market). This is commonly done within the National Accounts.

A unit has autonomy of decision in respect of its principal function, when it is responsible and accountable for the decisions and actions it takes[32].

Another criterion is related to the ownership of the assets. A public entity is controlled by government either through public ownership (more than 50 per cent of the shares) or by special legislation, regardless whether they produce market or non-market goods or services and regardless whether they have autonomy of decision or not.

The attribution of environmental goods and services to General Government or other sectors is also dependent on whether they are merchantable or not. A criterion used to evaluate the proportion of market output in the total output is the percentage of the production costs covered by the price used

[30] However, as an exception to this rule, there is a group of industries, generally classified as service industries, some of whose outputs have characteristics of goods. These are the industries concerned with the provision, storage, communication, and dissemination of information, advice, and entertainment in the broadest sense of those terms. The products of these industries, where ownership rights can be established, may be classified either as goods or services depending on the medium by which these outputs are supplied.

[31] OECD Productivity Manual: A Guide to the Measurement of Industry-Level and Aggregate Productivity Growth, OECD, Paris, March 2001, Annex 1 – Glossary. OECD Frascati Manual, Fifth edition, 1993, Annex 2, para. 29, page 116.

[32] Council Regulation (EEC) No 696/93 of 15 March 1993 on the statistical units for the observation and analysis of the production system in the Community. OJ L 76, 30.3.1993, p. 1–11.

for the sale of the product. According to the European System of Accounts 1995 (ESA 1995)[33], if this percentage is more or equal to 50 per cent, the activity is considered as a market activity (this is often referred to as the 50 per cent rule).

In general, producers pertaining to a public institution are non-market producers. However, public producers may also produce market services as their main activity. In some countries, this is in particular the case for the wastewater and waste management services where municipal departments without any autonomy of decision produce and cover their costs of production by their sales.

The definition of the General Government in the EGSS excludes government owned and controlled market units, known as public corporations, such as waste and wastewater treatment services. Such units are classified to the corporations' sectors.

Ancillary activities versus principal and secondary activities

The activities considered in the definition of the EGSS are production activities in the sense of National Accounts.

Activities combine resources such as equipment, labour, manufacturing techniques, information networks or products to create an output of technologies and products. An activity is characterized by an input of products (goods or services), a production process and an output of products (goods or services)[34].

The SNA 93 defines three types of activities: principal, secondary and ancillary. Principal and secondary activities are generally carried out with the support of a number of ancillary activities, such as accounting, transportation, storage, purchasing, sales promotion, repair and maintenance, etc. Production other than for capital formation which is retained for use in the same unit is referred to as ancillary activity. Thus, ancillary activities are those that exist solely to support the main productive activities of an entity by providing non-durable goods or services for the use of that entity.

The treatment of ancillary activities is quite different from the treatment of secondary activities. Ancillary activities are internal or integrated services; they are not put on the market separately. Examples of such activities in the EGSS are environmental management or waste and wastewater treatment on site. Ancillary activities will never be regarded as a separate statistical unit. The employment generated by such activities always is reported under the main activity.

According to the Regulation[35] on statistical units an activity must be regarded as ancillary if it satisfies each of the following conditions:

- it serves only the unit referred to: in other words, goods or services produced must not be sold on the market;
- a comparable activity on a similar scale is performed in similar production units;
- it produces services or, in exceptional cases, non-durable goods which do not come from part of the unit's end product (e.g. small implements or scaffolding);
- it contributes to the current costs of the unit itself, i.e. does not generate gross fixed capital formation.

[33] European System of Account 1995: http://forum.europa.eu.int/irc/dsis/nfaccount/info/data/ESA95 /esa95-new.htm

[34] NACE rev. 1.1, Statistical Classification of Economic Activities in the European Community, Introduction, Eurostat, May 1996, P. 14-15, Council Regulation (EEC), No. 696/93, Section IV B1 and B4 of 15.03.1993 on the statistical units for the observation and analysis of the production system in the Community and Eurostat

[35] Council Regulation (EEC), No. 696/93, Section IV B1 and B4 of 15.03.1993 on the statistical units for the observation and analysis of the production system in the Community

It should be noted that under the above definition the following activities are not to be regarded as ancillary:

- Production of goods or work carried out which forms part of fixed capital formation: in particular, construction work for own account. This is in line with the method used in NACE Rev 2, where units carrying out construction work for own account are classified under the building industry if data are available;
- Production of which a significant part is sold commercially, even if a major part is used as consumption in connection with the principal activity or secondary activities;
- The production of goods which subsequently become an integral part of the output of the principal or secondary activity - e.g. production of boxes, containers, etc. by a department of an enterprise for use in packing its products (secondary raw materials in the production of recycled products);
- The production of energy (integrated power station or integrated coking plant), even where this is consumed in its entirety in the principal or secondary activity of the parent unit;
- The purchase of goods for resale in (an) unaltered state;
- Research and development. These activities are not very widespread and do not produce services which are used in current production.

The distinction between ancillary, principal and secondary activity can be illustrated by a few examples:

- production of small implements for the unit's use is an ancillary activity;
- own-account transport is normally an ancillary activity;
- sales of own products are an ancillary activity because, as a general rule, it is not possible to produce without sales. However, if it is possible to identify a retail sales point within a production enterprise (direct sales to end-user) which may be, for example, a local unit, this sales point - exceptionally and for the purposes of certain analyses - may be regarded as a kind-of-activity unit. This observation unit then forms the subject of a twofold classification, i. e. in terms of the (principal or secondary) activity it performs within the enterprise and in terms of its own activity (retail sale).

If ancillary activities are carried out basically for the benefit of two or more kind-of-activity units, the cost of these ancillary activities must be spread over all the kind-of-activity units which they support. If data are available on the proportion of the costs which can be assigned to each of these distinct activities, the costs should be broken down accordingly. However, should no information of this kind be available, the cost of the ancillary activity should be broken down over the principal and secondary activities proportionately to the value of output minus intermediate costs excluding the costs of the ancillary activities themselves. If this method proves to be to difficult in practice, the cost of the ancillary activity may simply be broken down proportionately to the value of output.

It is possible that an activity starts out as ancillary but subsequently begins to provide services for sale to other entities. An activity of this kind may be developed to the point where it ceases to be an ancillary activity and must therefore be regarded as one of the principal or secondary activities of an entity. The only way of deciding whether a given activity should be regarded as an ancillary activity or a principal or secondary activity is to assess the role it plays in the enterprise as a whole.

NOTE: following the NACE 2 Introductory Guidelines, the auto production of (renewable) energy should not be accounted as an ancillary activity. Since the auto production of renewable energy is one of the most significant activities for Resource Management in some industrial sectors (mainly in the food industry and the paper industry), it should be recorded as an ancillary activity in the Standard Tables for the EGSS.

For statistical purposes in the context of EGSS, ancillary activities are these as defined by the Council Regulation (EEC) No. 696/93, Section IV B1 and B4 of 15.03.1993 on the statistical units for the observation and analysis of the production system in the Community and the Introductory Guidelines of NACE 2 plus auto production of renewable energy.

Annex 2. Details on the classification of environmental technologies and products and examples by environmental domain

This annex provides detailed definitions of the CEPA 2000 and CReMA 2008 classifications. The boxes contain examples by type of output and recommendations for each CEPA and CReMA class.

Environmental Protection group: CEPA 2000

CEPA is a common classification adopted by the United Nations (UN) and European statisticians and accountants in 1994 and replaced in 2000 by a new, revised version (CEPA 2000). CEPA 2000 is a generic, multipurpose and functional classification for Environmental Protection activities. It is used for classifying activities but also products, actual outlays and other transactions. The activities are generally classified by the environmental domain of protection (air, waste, nature protection, etc) and then by type of measure (prevention, treatment and control or measurement, etc). The CEPA 2000 is built starting from a classification matrix that cross-classifies the different kinds of activities carried out to protect the environment and the different kinds of environmental domains (i.e. different kinds of pollution and degradation).

1 PROTECTION OF AMBIENT AIR AND CLIMATE

Protection of ambient air and climate comprises measures and activities aimed at the reduction of emissions into the ambient air or ambient concentrations of air pollutants in addition to measures and activities aimed at the control of emissions of greenhouse gases and gases that adversely affect the stratospheric ozone layer. Standard Tables asks for which part of the protection of ambient air and climate is for the protection of climate and ozone layer.

Examples:

Environmental specific services: any activity that designs, manages systems or provides other services for the treatment and/or removal of exhaust gases and particulate matter from both stationary (electric power fuel combustion, industrial boilers and processes, etc.) and mobile sources (motor vehicles, etc.), measurement services of exhaust gases of vehicles as well as measurement services of exhaust gases of heating systems. It includes emission monitoring, assessment/evaluation/planning, regulation, administration, management, training, information and education on air emissions, etc..

Connected services: Installation and maintenance of equipments/facilities for air pollution control.

Connected goods: production of equipment or specific materials for facilities and equipments for air pollution control. In general all the measures to adapt vehicles (e.g. trucks, buses and aeroplanes) are included.

End-of-pipe technologies: facilities and equipments for air pollution control (e.g. facilities for the treatment of exhaust gases and ventilation air) as emission monitoring equipment, air-handling equipment, dust collectors, separators, precipitators, filters, catalytic converters, chemical treatment and recovery systems, specialised stacks, incinerators, scrubbers, cyclones, centrifuges, coolers and condensers to treat process gases, odour control equipment, equipment for thermal and catalytic combustion of process gases.

Integrated technologies: equipment or part thereof that generates less exhaust gas to be treated or released into the atmosphere. These are technologies replacing an existing production process or a part of it by a new one designed to reduce the generation of air pollutants during production, storage or transportation. It includes, for example, equipment for fuel combustion improvement (e.g. fluidised beds), prevention of spills and leaks through improving air-tightness of equipments.

Adapted goods: non (or less) – air polluting goods as de-sulphurised diesel, less air polluting transport facilities (low emissions and electric cars), substitutes of CFC.

Recommendation:

Excluded are activities for the prevention or minimisation of emissions of greenhouse gases which are related with the preservation of natural resources (e.g., renewable energy, energy saving equipments), which are included in the Resource Management group (Management of energy sources).

Activities aimed at fighting climate change should be recorded separately from the rest of CEPA 1 activities. The CEPA sub-classes allow for this operation. The relevant CEPA sub-classes for the protection of climate and ozone layer are: CEPA 1.1.2 (prevention of pollution through in-process modifications for the protection of climate and ozone layer), 1.2.2 (treatment of exhaust gases and ventilation air *for the protection of climate and ozone layer*) and the part of 1.3 (measurement, control, laboratories and the like *for the protection of climate and ozone layer*) and 1.4 (other activities) which is related to the protection of climate and ozone layer.

2 WASTEWATER MANAGEMENT

Wastewater is defined as water that is of no further immediate value for the purpose for which it was used or in the pursuit of which it was produced because of quality, quantity, or time of its occurrence.

Wastewater management comprises activities and measures aimed at the prevention of pollution of surface water through the reduction of the release of wastewater into inland surface water and seawater. It includes the collection and treatment of wastewater including monitoring and regulation activities. Septic tanks[36] and cooling water systems[37] are also included.

Mechanical treatment of wastewater designates processes of a physical and mechanical nature which result in decanted effluent and separate sludge. Mechanical processes are also used in combination and/or in conjunction with biological and advanced unit operations. Mechanical treatment is understood to include at least such processes as sedimentation, flotation, etc. The activity is aimed at separating materials in suspension by the use of screens (large solids) or through sedimentation eventually assisted by chemicals or flotation (elimination of sand, oil, part of the sludge, etc.).

Biological treatment of wastewater designates processes which employ aerobic or anaerobic micro-organisms and result in decanted effluent and separate sludge containing microbial mass together with pollutants. Biological treatment processes are also used in combination and/or in conjunction with mechanical and advanced unit operations. This activity is designed to eliminate pollution from oxidisable materials through the use of bacteria: activated sludge technique or anaerobic treatment for specific concentrated wastewater. Biodegradable materials are treated with the addition of bacteria-enriched sludge in open or closed tanks.

Treatment of wastewater by advanced technologies designates processes capable of reducing specific constituents in wastewater not normally achieved by other treatment options. Covers all unit operations which are not considered to be mechanical or biological. Advanced treatment processes may be used in combination and/or in conjunction with mechanical and biological unit operations. This activity is aimed at eliminating oxidisable non-biodegradable matter at a higher level, and also metals,

[36] Septic tanks are settling tanks through which wastewater flows and the suspended matter is decanted as sludge. Organic matter (in the water and in the sludge) is partly decomposed by anaerobic bacteria and other micro-organisms.

[37] Treatment of cooling water designates "processes which are used to treat cooling water to meet applicable environmental standards before releasing it into the environment. Cooling water is used to remove heat.

nitrate, phosphorous, etc. by using powerful biological or physical and chemical action. Special equipment is required for each de-pollution activity.

Examples:

Environmental specific services: services to render wastewater fit to meet applicable environmental standards or other quality norms; any activity that designs, operates systems or provides other services for sewage treatment, wastewater reuse and water handling or for the collection, treatment and transport of wastewater and cooling water. It also includes operation of sewerage networks, i.e. the collection and transport of wastewater from one or several users, and also rainwater, by means of sewerage networks, collectors, tanks and other means of transport (sewage vehicles, etc.), all other services aimed at wastewater management. It includes regulation, administration, management, training, information and education activities specific to wastewater.

Connected services: collection of septic tanks sludges, maintenance and repair services of septic tanks.

Connected goods: equipment aimed at monitoring and controlling the concentration of pollutants in wastewater and the quality of inland surface water and marine water at the place wastewater is discharged (analysis and measurement of pollutants, etc.) as well as equipment or specific materials for the collection, treatment and transport of wastewater and cooling water. Equipment includes screens for large solids, biological plants, equipment for filtration, flocculation, sedimentation; separators of oils and hydrocarbons; separators using inertia or gravity, including hydraulic and centrifugal cyclones, diaphragm floats, chemicals for coagulation, flocculation and precipitation; break-point chlorinating; stripping equipment; mixed media filtration; micro-screening; selective ion exchange; activated carbon; reverse osmosis; ultra-filtration; elector flotation, biological activators for septic tanks, cooling towers, cooling circuits for processing water from work sites and for condensing released vapour, equipment for enhancing the dispersion of cooling water on release (to the extent they are required to reduce pollution and not to reduce the use of water, and to the extent they are distinct from technical needs), etc. It includes pipes, pumps, valves, aeration equipment, gravity sedimentation equipment, oil separators, sedimentation basins, neutralisation basins, equipment for handling and treating sludge, chemical treatment and recovery equipment, biological recovery systems, oil/water separation systems, screens/strainers, sewage treatment equipment, water pollution control equipment, wastewater reuse equipment and other wastewater handling systems. It includes also collectors, pipelines, conduits and pumps to evacuate any wastewater (rainwater, domestic and other wastewater) from the points of generation to either a sewage treatment plant or to a point where wastewater is discharged into surface water. Septic tanks and other goods for septic tanks are included.

End-of-pipe technologies: sewerage network systems and wastewater treatment plants.

Adapted goods: Non (or less) – water polluting goods as biodegradable soap and detergents.

Integrated technologies: Equipment or part thereof that results in less wastewater to be treated or released into the environment. These are technologies replacing an existing production process or a part of it by a new one designed to bring about a reduction of water pollutants or wastewater generated during production. It includes the separation of networks, the treatment and re-use of water used in the production process etc.

Recommendation:

Excluded are activities aimed at the protection of groundwater from pollutant infiltration and the cleaning up of water bodies after pollution, which are included in CEPA 4. Restoration of water bodies

activities are included in CEPA 6. Water recirculation systems, to the extent they are required to reduce the use of water, are included in CReMA 10.

Distribution, collection and potabilisation of water are not included in the EGSS, while de-salinisation is included in CReMA 10.

3 WASTE MANAGEMENT

Waste management refers to activities and measures aimed at the prevention of the generation of waste and the reduction of its harmful effect on the environment. It includes the collection and treatment of waste, including monitoring and regulation activities. It also includes recycling and composting, the collection and treatment of low level radioactive waste, street cleaning and the collection of public litter.

Waste is materials that are not prime products (that is, products made for the market) for which the generator has no further use for its own purposes of production, transformation, or consumption, and which it wants to dispose of. Waste may be generated during the extraction of raw materials, during the processing of raw materials to intermediate and final products, during the consumption of final products, and during any other human activity. Residuals recycled or reused at the place of generation are excluded. Also excluded are waste materials that are directly discharged into ambient water or air.

Hazardous waste is waste that due to its toxic, infectious, radioactive, flammable or other character defined by the legislator poses a substantial actual or potential hazard to human health or living organisms. For the purposes of this definition, "hazardous waste" comprises for each country all those materials and products which are considered to be hazardous in accordance with that country's practices.

Low level radioactive waste is included, whereas other radioactive waste is excluded (see CEPA 7).

Low level radioactive waste is waste that, because of its low radionucleide content, does not require shielding during normal handling and transportation.

Treatment of waste refers to any process designed to change the physical, chemical, or biological character or composition of any waste to neutralise it, render it non-hazardous, safer for transport, amenable for recovery or storage, or to reduce it in volume. A particular waste may undergo more than one treatment process. Treatment of waste comprises the processes of physical/chemical treatment[38], thermal treatment[39], biological treatment, conditioning of wastes, and any other relevant treatment method.

Disposal of waste is the final deposition of waste on or underground in controlled or uncontrolled fashion, in accordance with the sanitary, environmental or security requirements. Disposal of waste comprises landfill[40], containment[41], underground disposal[42], dumping at sea, and any other relevant disposal method.

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[38] Physical treatment of hazardous waste includes various methods of phase separation and solidification whereby the hazardous waste is fixed in an inert, impervious matrix. Phase separation encompasses the widely used techniques of lagooning, sludge drying in beds, and prolonged storage in tanks, air flotation and various filtration and centrifugation techniques, adsorption/desorption, vacuum, extractive and azeotropic distillation. Solidification or fixation processes, which convert the waste into an insoluble, rock-hard material, are generally used as pre-treatment prior to landfill disposal. These techniques employ blending the waste with various reactants or organic polymerisation reactions or the mixing of the waste with organic binders.
Chemical treatment methods are used both to effect the complete breakdown of waste into non-toxic gases and, more usually, to modify the chemical properties of the waste, e.g. to reduce water solubility or to neutralise acidity or alkalinity.

[39] Thermal treatment or incineration of waste refers to any process for the high temperature oxidation of gaseous, liquid, or solid waste, converting it into gases and incombustible solid residues. The flue gases are released into the atmosphere (with or without recovery of heat and with or without cleaning) and any slag or fly ash produced is deposited in the landfill. Residues from waste incineration may be regarded as hazardous waste. The resulting thermal energy may or may not be used for the production of steam, hot water, or electrical energy.

[40] Landfill is an activity concerning final disposal of waste in or on land in a controlled way, which meets specific geological and technical criteria.

[41] Containment is the retention of hazardous material in such a way that it is effectively prevented from dispersing into the environment, or is released only at an acceptable level. Containment may occur in specially built containment spaces.

[42] Underground disposal includes temporary storage or final disposal of hazardous wastes underground that meet specific geological and technical criteria.

Examples:

Environmental specific services: any activity that designs, operates systems or provides other services waste handling and for the separation, sorting, treatment, disposal, management, storage and recovery of hazardous and non-hazardous waste. It includes the collection and transport of waste, either by municipal services or similar institutions or by public or private corporations, and their transport to the place of treatment or disposal. It includes the separate collection and transport of waste fractions so as to facilitate recycling and the collection and transport of hazardous waste. Street cleaning is included for the part referring to public litter and collection of garbage from the streets. Excluded are winter services. It includes recycling (including collection of waste and scrap and sorting, baling, cleaning). Services for the treatment of low-level nuclear waste are included. It includes administration, management, training, information and education activities specific to waste.

Connected services: installation of facilities and equipments for waste management.

Connected goods: Equipment aimed at controlling and measuring the generation and storage of waste, their toxicity, etc. Equipment or specific materials for the collection, treatment, transport, disposal and recovery of hazardous and non-hazardous waste. It includes compressors, containers, waste storage equipment, waste collection equipment, waste disposal equipment, waste handling equipment, waste separation and sorting equipment, recovery equipment (e.g. rotary kilns, liquid injectors, incinerator grates, multiple chamber incinerators, fluidised bed incinerators, etc). Trash bags, bins, rubbish containers, compost containers are included. It includes equipment or specific materials for the treatment of low-level nuclear waste.

End-of-pipe technologies: facilities for waste management as for example, waste treatment, storage and disposal facilities (e.g. landfills, incinerators, etc.), hazardous waste management facilities or recycling facilities.

Adapted goods: New goods which produces less waste or less hazardous waste. All the goods designed to produce less waste or less harmful waste, as for example biodegradable plastic bags, and end of life goods more easily recyclable (e.g. packaging, cars, electric and electronic equipments, etc, more easily recyclable).

Integrated technologies: Equipment that minimises waste generation. This includes recycling processes and technologies replacing an existing production process by a new one designed to reduce toxicity or volume of waste produced during the production process, including by separation and re-processing.

Recommendation:

Excluded are activities and measures for the treatment of high-level nuclear waste (see CEPA 7) as well as the manufacture of new materials or products from waste or scrap and the subsequent use of these materials or products (see management of minerals (CReMA 14) in the Resources Management group, as well as management of natural forests (CReMA 11) as far as the production of recycled paper is concerned).

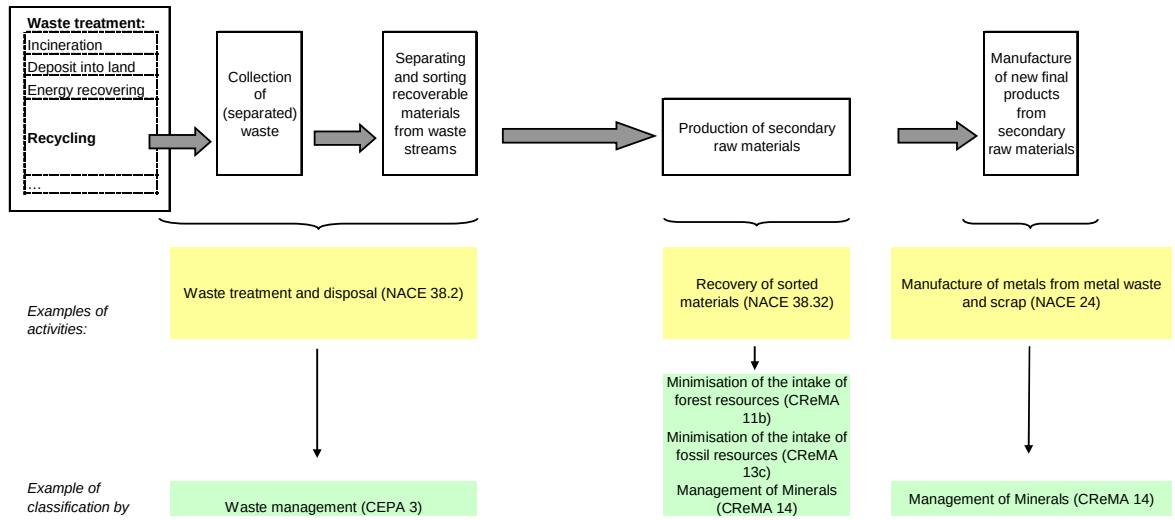

Figure A2.1 : Recycling activities: environmental protection and natural Resources Management

Recycling activities included in the CEPA 3 are separating and sorting materials from waste streams,. When a process is required, either mechanical or chemical, for the processing of waste and scraps into a form feasible to be used as new materials, the recycling activities should be classified in the CReMA group. The group of Environmental Protection activities therefore excludes manufacture of secondary raw material or products from waste and scrap. Secondary raw materials (and also products made from secondary raw materials) are considered as Resource Management products aiming at the saving of raw materials (CReMA 14), oil resources (CReMA 13c) and forest resources (CReMA 11b). Figure A.1 describes the classification of recycling activities.

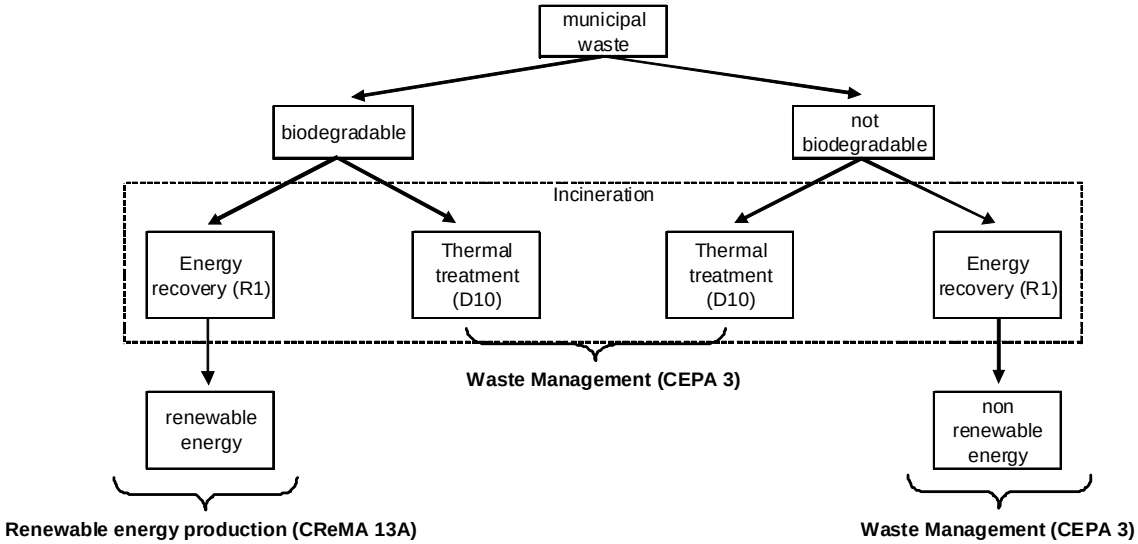

Figure A2.2 : Incineration activities: waste management and production of renewable energy

With regards to waste incineration, if its main purpose is the thermal treatment of waste, then it is included in CEPA 3. Only if the waste are biodegradable and the main purpose of waste incineration is energy recovery, then it is included in CReMA 13a, renewable energy production, following the IEA definition. Figures A.2 describes the classification of incineration activities.

4 PROTECTION AND REMEDIATION OF SOIL, GROUNDWATER AND SURFACE WATER

Protection and remediation of soil, groundwater and surface water refers to measures and activities aimed at the prevention of pollutant infiltration, cleaning up of soils and water bodies and the protection of soil from erosion and other physical degradation and also from salinisation. Monitoring, control of soil and groundwater pollution are included.

Examples:

Environmental specific services: any activity that designs, manages systems or provides other services to reduce the quantity of polluting materials in soil and water, including surface water, groundwater and seawater. It includes the cleaning-up of polluting materials in soil and water bodies either in situ or in appropriate installations, emergency response and spills clean-up systems, operation of water treatment facilities (treatment of water and dredging residues are included), transportation of pollutant products, soil decontamination at former industrial sites, landfills and other black spots, dredging of pollutants from water bodies (rivers, lakes, estuaries, etc.), the decontamination and cleaning up of surface water following accidental pollution e.g. through collection of pollutants or through application of chemicals, and also the cleaning up of oil spills on land, inland surface waters and seas – including coastal areas, separating, containing and recovering deposits, extraction of buried casks and containers, decanting and re-storage, installation of off-gas and liquid effluent drainage networks, soil washing by means of degasification, pumping of pollutants, removal and treatment of polluted soil, biotechnological methods capable of intervening without affecting the site (use of enzymes, bacteria, etc.), physical chemistry techniques such as pervaporation and extraction using supercritical fluids, injection of neutral gases or bases to stifle internal fermentation, administration, management, training, information and education activities related to the protection and remediation of soil, groundwater and surface water, etc.

Connected services: Services related to sealing of soils of industrial plants, strengthening of storage facilities, lowering of groundwater tables (when groundwater contains high levels of salts) through long-term re-vegetation programmes, changes in irrigation practices, etc.

Connected goods: equipment or specific materials to reduce the quantity of polluting materials in soil and water, including surface water, groundwater and seawater. It includes absorbents, chemicals and bioremediators for cleaning up, compactors, encrustors, anti-erosion walls, etc.

End-of-pipe technologies: facilities for remediation and clean-up of soil, surface water and groundwater, equipment for controlling and measuring the quality and pollution of soils, groundwater and surface water, equipment for measuring the extent of soil erosion and salinisation, as well as cleaning-up systems either in situ or in appropriate installations, catchment equipment for pollutant run-offs and leaks, etc.

Adapted goods: Organic farming goods .

Integrated technologies: Equipment or practices that allows the prevention of polluting substances that may be applied to soil (e.g. organic farming), percolate into groundwater or run-off to surface water and equipment and practices aimed at the protection of soil from erosion and other physical degradation.,.

Recommendation:

Excluded are wastewater management activities (which are included in CEPA 2) and activities aimed at the protection of biodiversity and landscape (which are included in CEPA 6). Excluded are also the liming of lakes and artificial oxygenation of water bodies (see CEPA 6) as well as civil protection services.

Activities carried out for economic reasons (e.g. agricultural production, protection of settlements against natural hazards such as landslides or reclamation of land from the sea) are not included in the scope of the EGSS.

5 NOISE AND VIBRATION ABATEMENT (EXCLUDING WORKPLACE PROTECTION)

Noise and vibration abatement refers to measures and activities aimed at the control, reduction and abatement of industrial and transport noise and vibration. Activities for the abatement of neighbourhood noise (e.g. soundproofing of dancing halls, etc.) in addition to activities for the abatement of noise in places frequented by the public (e.g. swimming pools, schools, etc.) are included.

Examples:

Environmental specific services: it includes, when separable, traffic management with noise abatement purposes (for example, lowering of speed limits, improvement of traffic flows), introduction of time and geographical restrictions for noisy vehicles, traffic detours at a distance from residential areas, creation of pedestrian areas, creation of construction-free buffer zones, restructuring of modal split, administrative measures for the promotion of quiet driving behaviour, etc. It includes noise and vibration assessment and monitoring and design, management or other services for acoustic and soundproof screens, street covering, covering sections of urban motorways or railroads, soundproofing of buildings, etc. Also includes administration, management, training, information and education activities specific to noise/vibration.

Connected services: Installation and management of facilities for noise and vibration abatement (for example, highway barriers, screens, embankments or hedges).

Connected goods: It includes mufflers/silencers, noise deadening material, noise control equipment and systems, vibration control equipment and systems, highway barriers, add-on facilities covering and soundproofing of machines and piping, fuel regulation systems and sound absorption, noise screens, barriers, noise protective windows, etc.

End-of-pipe technologies: highway barriers, screens, embankments or hedges. They thus range from noise barriers produced by construction enterprises, to noise and vibration control equipment produced by engineering and industrial control enterprises.

Adapted goods: Low-noise vehicles and appliances, silent asphalt. It includes the adaptation of vehicles (buses, trucks, or train and power units in the case of rail transport, aircraft and ships) in order to make them less noisy.

Integrated technologies: Technologies aimed at the prevention of noise and vibration from industrial equipment, vehicle motors, aircraft and ships engines, exhaust systems and brakes, or noise level due to tyre/road or wheel/rail surface contact, , plant modifications, specially conceived foundations to absorb vibrations, equipment and machines conceived or constructed for low noise or vibrations, low noise level flares and burners, etc.

Recommendation:

The abatement of noise and vibration for purposes of protection at the workplace is <u>not included</u> in the scope of the EGSS.

6 PROTECTION OF BIODIVERSITY AND LANDSCAPES

Protection of biodiversity and landscape refers to measures and activities aimed at the protection and rehabilitation of fauna and flora species, ecosystems and habitats in addition to the protection and rehabilitation of natural and semi-natural landscapes. Maintaining or establishing certain landscape types, biotopes, eco-zones and related issues (hedgerows, lines of trees to re-establish 'natural corridors') have a clear link to biodiversity preservation.

Examples:

Environmental specific services: Services aimed at the protection of natural and semi-natural landscapes to maintain and increase their aesthetic value and their role in biodiversity preservation. Included are the preservation of legally protected natural objects, conserving the genetic heritage, protection of forests against forest fires for landscape protection purpose, etc.

Services aimed at the conservation, reintroduction or recovery of fauna and flora species, in addition to the restoring, rehabilitation and reshaping of damaged habitats for the purpose of strengthening their natural functions. Includes the rehabilitation of abandoned mining and quarrying sites, renaturalisation of river banks, burying of electric lines, maintenance of landscapes that are the result of traditional agricultural practices threatened by prevailing economic conditions, re-colonising destroyed ecosystems, placing bans on exploitation, trade, etc. of specific animal and plant species, for protection purposes. Also includes censuses, inventories, databases, creation of gene reserves or banks, improvement of linear infrastructures (e.g., underground passages or bridges for animals at highways or railways, etc.), feeding of the young, management of special natural reserves (botany conservation areas, etc.). Also include the control of fauna and flora to maintain natural balances, including re-introduction of predator species and control of exotic fauna and flora that pose a threat to native fauna, flora and habitats. Main services are the management and development of protected areas, whatever the denomination they receive, i.e. areas protected from any economic exploitation or in which the latter is subject to restrictive regulations whose explicit goal is the conservation and protection of habitats. Also included are services for the restoration of water bodies as aquatic habitats: artificial oxygenation and lime-neutralisation actions. It includes administration, training, information and education activities specific to the domain.

Connected goods: no example available for connected goods.

End-of-pipe technologies: no example available for end-of-pipe technologies.

Adapted goods: no example available for adapted goods.

Integrated technologies: no example available for integrated technologies.

Recommendation:

The protection and rehabilitation of historic monuments or predominantly built-up landscapes, the control of weeds for agricultural purposes, measures to increase aesthetic values for economic purposes (e.g., re-landscaping to increase the value of real estates) are not included in the scope of the EGSS. The protection of forests against forests fire when this predominantly responds to economic reasons is not included (it is to be included within CReMA 11 management of natural forests, if it concerns natural forests mainly relevant as a resource). Also excluded are the establishment and maintenance of green spaces along roads and recreational structures (e.g. golf courses, other sports facilities).

Actions related to urban parks and gardens would not normally be included but may relate in some cases to biodiversity – in such cases the activities should be included in CEPA 6.

7 PROTECTION AGAINST RADIATION (EXCLUDING EXTERNAL SAFETY)

Protection against radiation refers to activities and measures aimed at the reduction or elimination of the negative consequences of radiation emitted from any source. Included is the handling, transportation and treatment of high level radioactive waste, i.e. waste that, because of its high radionuclide content, requires shielding during normal handling and transportation.

Radioactive waste consits of any material that contains or is contaminated with radionuclides at concentrations or radioactivity levels greater than the "exempt quantities" established by the competent authorities, and for which no use is foreseen. Radioactive wastes are produced at nuclear power plants and at associated nuclear fuel cycle facilities and also through other uses of radioactive material, for example, the use of radionuclides in hospitals and research establishments. Other important wastes are those from mining and milling of uranium and from the reprocessing of spent fuel.

Examples:

Environmental specific services: Services for the collection, transport[43], conditioning[44], containment[45] or underground disposal[46] of high level radioactive waste. It includes creation of buffer zones and administration, training, information and education activities specific to the domain.

Connected services: installation of specific equipment and instruments (see connected goods thereafter).

Connected goods: specific equipment and instruments aimed at measuring, controlling and monitoring ambient radioactivity and radioactivity due to high level radioactive waste, screens, etc.

End-of-pipe technologies: facilities for containment and disposal of high level radioactive waste.

Adapted goods: no example available for adapted goods.

Integrated technologies: no example available for integrated technologies.

Recommendation:

Activities and measures related to the prevention of technological hazards (e.g. external safety of nuclear power plants and military installation), in addition to protection measures taken at workplaces are excluded. Also excluded are activities relating to collection and treatment of low-level radioactive waste (see CEPA 3).

8 RESEARCH AND DEVELOPMENT

Research and development (R&D) comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge and the use of this knowledge to devise new applications (see Frascati manual, OECD, 1994) in the field of Environmental Protection.

The class regroups all R&D activities oriented towards Environmental Protection: identification and analysis of sources of pollution, mechanisms of dispersion of pollutants in the environment in addition to their effects on human beings, the species and the biosphere. It covers R&D for the prevention and elimination of all forms of pollution, and also R&D oriented towards equipment and instruments of

[43] Collection and transport of high level radioactive waste consists of the collection of high level radioactive waste, generally by specialised firms and their transport to the place of treatment, conditioning storage and disposal.

[44] Conditioning of high level radioactive waste consists of activities that transform high level radioactive waste into a proper and fit condition for transport and/or storage and/or disposal.

[45] Containment of high level radioactive waste designates the retention of radioactive waste in such a way that it is effectively prevented from dispersing into the environment, or is released only at an acceptable level. Containment may occur in specially built containment spaces.

[46] Underground disposal of high level radioactive waste is the temporary storage or final disposal of high level radioactive waste in underground sites that meet specific geological and technical criteria.

pollution measurement and analysis. When separable, all R&D activities have to be classified under this position even when referring to a specific environmental domain.

Examples:

Environmental specific services: environmental R&D.

Connected services: no example available for connected services.

Connected goods: no example available for connected goods.

End-of-pipe technologies: no example available for end-of-pipe technologies.

Adapted goods: no example available for adapted goods.

Integrated technologies: no example available for integrated technologies.

9 OTHER ENVIRONMENTAL PROTECTION ACTIVITIES

Other Environmental Protection activities refers to all Environmental Protection activities which take the form of general environmental administration and management activities or training or teaching activities specifically oriented towards Environmental Protection or which consist of public information, when they are not classified elsewhere in CEPA. It also includes activities leading to indivisible classification, in addition to activities not elsewhere classified.

The activities of the general educational system are not included in the scope of the EGSS.

Examples:

Environmental specific services: construction and installation of facilities for environmental monitoring, analysis and assessment; multidisciplinary environmental contracting, consulting, audit and engineering services (which include any activity that investigates feasibility, designs and manages environmental projects, engineering design and specifications, biological and ecosystem studies, environment impact assessment, environmental planning, laboratory and field services, environmental economics, legal services/environmental law, environmental certification processes (ISO 14000, EMAS), monitoring sites, operating both singly and in networks, and covering one or more environmental medium, measuring and monitoring, sampling, process and control, data acquisition, management and analysis, etc.), etc. Includes also the regulation or administration of the environment and the support of decisions taken in the context of Environmental Protection activities, environmental supervision and analysis, general environmental education or training and disseminating environmental information.

Connected goods: Equipment or specific materials for the sampling, measurement, and subsequent recording, analysis and assessment of various characteristics of environmental media.

Connected services: no example available for connecetd services.

End-of-pipe technologies: no example available for end-of-pipe technologies.

Adapted goods no example available for adapted goods.

Integrated technologies: no example available for integrated technologies.

Resources Management group: CReMA 2008

The Classification of Resource Management Activities (CReMA) adopted in this handbook is a revised and adapted version of Istat's Classification of Resource Use and Management Activities (CRUMA)[47]. In order to keep a certain level of consistency between data, it refers to recent advances of the SERIEE when dealing with classification of Resource Management activities. It is devoted to the description of production of technologies, goods and services carried out to manage and save the stock of natural resources against depletion phenomena (quantitative perspective).

The classification has been developed consistently with the SERIEE framework and the structure and classification principles of the CEPA. Therefore, the classification of natural Resources Management activities is built in a similar way, starting from an analogous classification matrix that cross-classifies the different kinds of activities carried out to manage the natural resources and the different environmental domains.

According to the SERIEE guidelines, the matrix cross-classifies the different kinds of activities carried out to use and manage the natural resources and the different kinds of natural resources. A list of CReMA categories is then derived by identifying the possible Resources Management activities falling in each cell of the classification matrix. Categories are built complementarily with CEPA but without any overlapping with CEPA classes.

10 MANAGEMENT OF WATER

Activities aiming at the minimisation of the inland waters intake through in-process modifications as well the reduction of water losses and leaks or reduction of the intake by substituting the resource with alternative resources, the installation and construction of facilities for water reuse and savings, shower heads and taps, etc. Restoration activities are included.

Examples:

Environmental specific services: recharge of groundwater bodies to increase/restore water stocks (not to improve water quality or fight salinity, see CEPA 4.4); land improvement, development of vegetal cover in order to increase water infiltration and recharge phreatic water bodies (not for the protection of soil against erosion, see CEPA 4.3). Activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management of inland waters and water saving.

Connected goods: rainwater storage tanks.

Adapted goods: tap filters, differentiate system for flushing the toilets, washing-machine or dishwasher using less water than the average equivalent product, dry toilets, desalinated water.

End-of-pipe technologies: Water restoration, measuring and monitoring equipment.

Integrated technologies: reduction of the intake through in-process modification related to the reduction of the water input for the production process: closed-circuit cooling systems, drop irrigation system, de-salinisation of sea water plants, etc.

[47] Ardi, C. and Falcitelli F. (2007), The Classification of Resource Use and Management Activities (CRUMA) and Expenditure, Istat, Roma

Recommendation:

Distribution, collection and potabilisation of water are not included in the EGSS.

11 MANAGEMENT OF FOREST RESOURCES

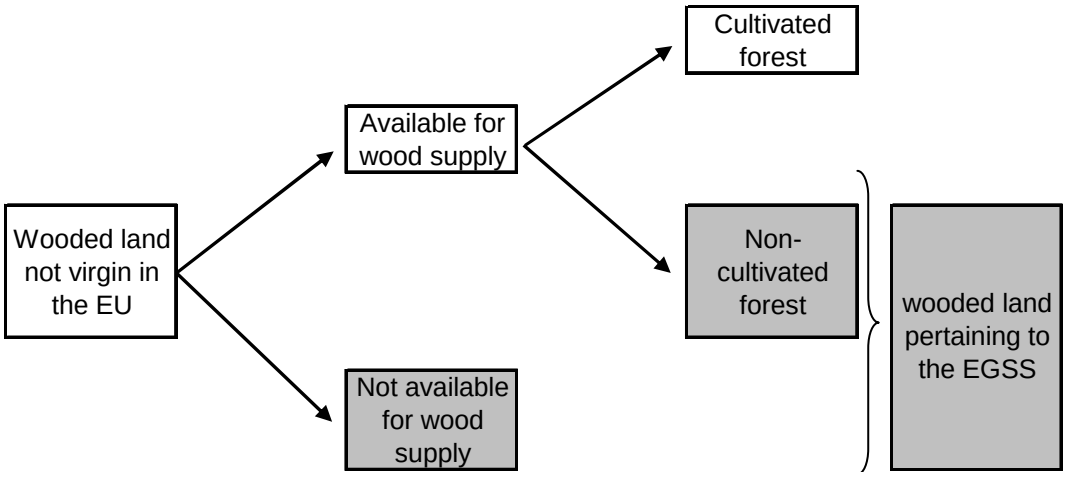

Figure A2.3: Forest activities definition and classification

Management of forest resources dealt with only a part of the wooded land. According to the SERIEE, only those natural resources corresponding to non produced natural assets whose use takes the form of goods, are dealt with in the natural resource use and management account. Hence produced natural resources, i.e. produced wooded resources, are excluded.

The basic classification of forest and other wooded land refers to the availability of wooded land to supply wood (see IEEAF[48]). Hence, some wooded lands are available for wood supply and other are not. Both categories are defined as follows (IEEAF § 3.07).

- Forest not available for wood supply: "Forest where legal, economic or specific environmental restrictions prevent any significant supply of wood. It includes (a) forest with legal restrictions or restrictions resulting from other political decisions, which totally exclude or severely limit wood supply, inter alia for reasons of environmental or biodiversity conservation, e.g. protection forest, national parks, nature reserves and other protected areas such as those of special environmental, scientific, historical, cultural or spiritual interest; (b) forest where physical productivity or wood quality is too low or harvesting and transport costs are too high to warrant wood harvesting, apart from occasional cuttings for auto-consumption".

- Forest available for wood supply: "Forest and other wooded land where any legal, economic or specific environmental restrictions do not have a significant impact on the supply of wood. It includes areas, where although there are no such restrictions, harvesting is not taking place, for example, areas included in long-term utilisation plans or intentions".

Wooded land available for wood supply can be further split into cultivated and non cultivated forests.

[48] Eurostat and European Commission, (2002), "The European framework for integrated environmental and economic accounting for forests – IEEAF".

This means that forest not available for wood supply and forest available for wood supply classified as non cultivated forest are the object of the activities described in CReMA 11 in accordance with SERIEE.

Hence, forest land available for wood supply classified as cultivated forests do not fall into the scope of the natural resources covered by the EGSS. This means for example that certified ("sustainable") wood is not considered as an adapted good because it comes and it substitutes mainly products from cultivated forests, i.e. a produced natural resource which is not included in the scope of the EGSS.

The Management of Forest Resources can be further divided into management of forest areas and the minimisation of the intake of forest resources.

11A Management of forest areas: The focus of the class is on non-cultivated and non-available for wood supply forests and all the activities carried out for their maintenance and management. This includes restoration activities (reforestation and afforestation) as well as the prevention and control of forest fires. Activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management of non-cultivated forest and forests not available for wood supply.

For example reforestation of non-cultivated forests should be included, even if it is carried out for maintaining the function of providing the wood resource for forestry and logging purposes. What is relevant is that the forests concerned are non-cultivated or not availabe for wood supply and the activities are aiming mainly at maintaining the "resource functions" of forests. The kind of activity (reforestation) in itself is not enough for including/excluding an activity: it must be cross-classified with the natural resource, i.e. non-cultivated or not available for wood supply forests.

Examples:

Environmental specific services: restoration activities, education, training, information, sensibilisation and general administration activities linked to non-cultivated forests management.

Connected services: no example available of connected services

Connected goods: goods for restoring non cultivated forests?

Adapted goods: no example available of adapted goods

End-of-pipe technologies: Forest restoration, measuring and monitoring equipment

Integrated technologies: certified management systems applied to non-cultivated forests

11B Minimisation of the intake of forest resources: Activities aiming at the minimisation of the intake of forest resources through in-process modifications as well as the recycling, reuse or savings of forest products and by-products.

Examples:

Environmental specific services: education, training, information, sensibilisation to the reduction of the intake of forest resources.

Connected services: no example available of connected services

Connected goods: no example available of connected goods

End-of-pipe technologies: no example available of end-of-pipe technologies

Adapted goods: recycled paper, products made of recycled wood

Integrated technologies: paper and wood recycling equipment.

12 MANAGEMENT OF WILD FLORA AND FAUNA

Activities aiming at the minimisation of the intake of wild flora and fauna through in-process modifications as well as withdrawals reduction and regulation measures. Restoration activities are included (replenishment of wild flora and fauna stocks). Activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management of wild flora and fauna.

The focus is on “wild” flora and fauna and all the activities carried out for their maintenance and management. Often the management of game reserves, like e.g. in the case of birds, has the purpose of maintaining the stock of “wild” fauna, even if for hunting purposes. What is relevant is that the flora and fauna concerned are “wild” and the activities are aiming mainly at maintaining the “resource functions” (SEEA concept) of wild flora and fauna.

Examples:

Environmental specific services: General Government activities for preserving stocks through the enforcement of quotas, regulation, monitoring, control for e.g. fishing activities. Repopulation of stocks of wild fauna by introducing new individuals.

Connected services: no example available of connected services

Connected goods: no example available of connected goods

End-of-pipe technologies: Flora and fauna restoration, measuring and monitoring equipment

Adapted goods: no example available of adapted goods

Integrated technologies: no example available of adapted technologies

Recommendations:

CEPA 6 relates to the protection of biodiversity which concerns essentially threatened species. In the field of flora and fauna resources (CReMA 12), what is relevant is the stock of e.g. fish and wild animals.

13 MANAGEMENT OF ENERGY RESOURCES

Activities aiming at the minimisation of the intake of fossil resources through the production of energy from renewable sources, Heat/Energy saving and management and the minimisation of the intake of fossil resources for raw materials for other use than energy production.

Exploitation, management and maintenance of the stocks of non-renewable energy sources (including exploration and discovery of new reserves) are not included in the scope of the EGSS.

13A Production of energy from renewable sources: Reduction of non-renewable energy sources exploitation through the production of energy from renewable sources. The definition of renewable energy adopted in this handbook is the definition of the International Energy Agency (IEA).

Definition of "renewable energy": the International Energy Agency (IEA)[49]

The International Energy Agency includes the following categories into its definition of renewables:

- *Hydropower*: Potential and kinetic energy of water converted into electricity in hydroelectric plants. It includes large as well as small hydro, regardless of the size of the plants.

- *Geothermal Energy*: Energy available as heat emitted from within the earth's crust, usually in the form of hot water or steam. It is exploited at suitable sites for electricity generation after transformation, or directly as heat for district heating, agriculture, etc.

- *Solar Energy*: Solar radiation exploited for hot water production and electricity generation. Does not account for: passive solar energy for direct heating, cooling and lighting of dwellings or other.

- *Wind Energy*: Kinetic energy of wind exploited for electricity generation in wind turbines.

- *Tide/Wave/Ocean Energy*: Mechanical energy derived from tidal movement, wave motion or ocean current, and exploited for electricity generation.

- *Solid Biomass*: Covers organic, non-fossil material of biological origin which may be used as fuel for heat production or electricity generation.

- *Wood, Wood Waste, Other Solid Waste*: Covers purpose-grown energy crops (poplar, willow etc.), a multitude of woody materials generated by an industrial process (wood/paper industry in particular) or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, black liquor etc.) as well as wastes such as straw, rice husks, nut shells, poultry litter, crushed grape dregs etc.

- *Charcoal*: Covers the solid residue of the destructive distillation and pyrolysis of wood and other vegetal material.

- *Biogas*: Gases composed principally of methane and carbon dioxide produced by anaerobic digestion of biomass and combusted to produce heat and/or power.

- *Liquid Biofuels*: Bio-based liquid fuel from biomass transformation, mainly used in transportation applications.

- *Municipal Waste* (renewables): Municipal waste energy comprises wastes produced by the residential, commercial and public services sectors and incinerated in specific installations to produce heat and/or power. The renewable energy portion is defined by the energy value of combusted biodegradable material.

[49] Source: OECD/IEA (2007), Renewables in global energy supply.

- *Combustible Renewables and Waste* (CRW): Some of the waste (the non-biodegradable part of the waste) is not considered renewables as such. However, proper breakdown between renewables and non-renewables is not always available.

Examples:

Environmental specific services: no examples of environmental specific services

Connected services: installation of equipments for the production of renewable energy.

Connected goods: components of solar panels, wind mills, hydropower equipment, etc

End-of-pipe technologies: monitoring equipment of renewable energy sources.

Adapted goods: renewable energy

Integrated technologies: equipments for the production of renewable energy such as wind mills, solar panels, etc.

Recommendations:

By adopting the IEA definition of renewable energy sources, CReMA 13A includes the energy produced from burning biomass wastes when the purpose is energy recovery. Nevertheless if the main purpose of waste incineration is the thermal treatment of waste in waste treatment facilities then it is included in CEPA 3 (see CEPA 3 and figure A.2).

13B Heat/Energy saving and management: Activities aiming at the minimisation of the intake of non-renewable energy sources through in-process modifications as well as the minimisation of heat and energy losses and through energy savings. Activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management and saving of heat and energy.

Examples:

Environmental specific services: insulation, bio-architecture, etc services.

Connected services: installation of equipment for combined heat and power production, etc.

Connected goods: no example available of connected goods

End-of-pipe technologies: equipment for monitoring and measurement of heat and energy consumptiom.

Adapted goods: double glazing windows, low energy buildings, heat from solar panels and heat pumps, less energy consuming devices

Integrated technologies: equipment for heat/energy saving, heat exchangers for the recycling of heat from air and waste water, heat pumps for the production of heat, combined heat and power,.

13C Minimisation of the intake of fossil resources for raw materials for other use than energy production: Activities aiming at the minimisation of the intake of fossil resources for raw materials for other use than energy production (e.g. the production of plastic, chemicals, rubber). Activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management and saving of fossil resources used as input for productions other than energy production.

Examples:

Environmental specific services: no examples of environmental specific services

Connected services: . no example available of connected services

Connected goods: components of plastic recycling equipment

End-of-pipe technologies: no example available of end-of-pipe technologies

Adapted goods: bioplastic bags, retreaded tyres, recycled plastic materials

Integrated technologies: Plastic recycling equipment.

14 MANAGEMENT OF MINERALS

Activities aiming at the minimisation of the intake of minerals through in-process modifications as well as the reduction of scraps and the production and consumption of recycled materials and products. Activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management of minerals.

Examples:

Environmental specific services: no example available of environmental specific services

Connected services: no example available of connected services

Connected goods: no example available of connected goods

End-of-pipe technologies: no example available of end-of-pipe technologies

Adapted goods: recycled metals, recycled glass products, recycled ceramic products

Integrated technologies: Metal recycling ovens (electric arc furnace), recycling glass equipment, etc

Recommendations:

The management of quarrying sites as well as exploitation, management and maintenance of minerals stocks (including research and exploration activities) are not included in the scope of the EGSS. Excluded from CReMA 14 are the collection, transportation and sorting of waste which are to be recorded in CEPA 3.

The production of energy from waste incinerator is to be recorded in CReMA 13A. The production of recycled paper and recycled wooden products is also excluded; it is included in CReMA 11.

15 RESEARCH AND DEVELOPMENT ACTIVITIES FOR NATURAL RESOURCE MANAGEMENT

Creative work undertaken on a systematic basis in order to increase the stock of knowledge and the use of this knowledge to devise new applications in the field of natural Resource Management and savings.

Examples:

Environmental specific services: resources preservation R&D.

Connected services: no example available for connected services.

Connected goods: no example available for connected goods.

End-of-pipe technologies: no example available for end-of-pipe technologies.

Adapted goods: no example available for adapted goods.

Integrated technologies: no example available for integrated technologies.

Recommendations:

Excluded are R&D activities related mainly to Environmental Protection (see CEPA 8)

16 OTHER NATURAL RESOURCE MANAGEMENT ACTIVITIES

Natural Resource Management activities not classifiable in the previous classes, i.e. general administration, education, training and information activities that relate to two natural resources or more, as well as other kind of activities lead to indivisible output.

Examples:

Environmental specific services : services: construction and installation of facilities for resources monitoring, analysis and assessment; multidisciplinary contracting, consulting, audit and engineering services (which include any activity that investigates feasibility, designs and manages resources preservation projects, engineering design and specifications, studies, depletion assessment, laboratory and field services, legal services/environmental, monitoring sites, operating both singly and in networks, and covering one or more natural resources, measuring and monitoring, sampling, process and control, data acquisition, management and analysis, etc.), etc. Includes also the regulation or administration and the support of decisions taken in the context of resources preservation, supervision and analysis, education or training and disseminating information on Resources Management.

Connected goods: equipment or specific materials for the sampling, measurement, and subsequent recording, analysis and assessment of various characteristics of natural resources.

Adapted goods: no example available for adapted goods.

End-of-pipe technologies: no example available for end-of-pipe technologies.

Integrated technologies: no example available for integrated technologies.

Recommendations:

Excluded are general administration, education, training and information activities related mainly to Environmental Protection (see CEPA 9).

Table A2.1 : Correspondence table between the Environmental industry OECD/Eurostat manual and the EGSS handbook environmental classifications for the EGSS

OECD EUROSTAT 1999 / EGSS Handbook	Air pollution control	Wastewater management	Solid waste management	Remediation and clean up of soil and water	Noise and vibration abatement	Environmental R&D, monitoring, etc.	Other	Cleaner technologies and processes	Cleaner products	Indoor air pollution control[1]	Water supply[2]	Recycled materials	Renewable energy plant	Heat/Energy saving and management	Sustainable agriculture and fisheries	Sustainable forestry	Natural risk management	Eco-tourism	Other
CEPA 1 Protection of ambient air and climate	X							X	X							X		X	
CEPA 2 Wastewater management		X						X	X									X	
CEPA 3 Waste management			X					X	X									X	
CEPA 4 Protec. and remediation of soil and surface water				X				X	X						X[3]	X		X	
CEPA 5 Noise and vibration abatement					X			X	X										
CEPA 6 Protection of biodiversity and landscape								X	X						X[3,4]	X		X	
CEPA 7 Protection against radiation							X	X	X										
CEPA 8 Research and development						X	X	X	X										
CEPA 9 Other environmental protection activities								X	X										
CReMA 10 Management of waters								X	X		X							X	
CReMA 11A Management of forest areas								X	X							X			
CReMA 11B Min. of the intake of nat. forest resources								X	X			X							
CReMA 12 Management of wild flora and fauna								X	X						X[4]				
CReMA 13A Manag. of energy res.: renewable energy								X	X				X						
CReMA 13B Manag. of energy res.: heat/energy saving								X	X					X				X	
CReMA 13C Minim. intake of fossil resources for other use than energy production								X	X			X							
CReMA 14 Management of minerals								X	X			X							
CReMA 15 Research and development								X	X										X
CReMA 16 Other natural Resource Management activities								X	X										X

[1] This is not considered as part of the EGSS by this Handbook since it has mainly to do with human health.
[2] Only activities aiming at minimisation of water intake are part of the EGSS. Thus supply and distribution are not part of the EGSS.
[3] Organic farming.
[4] "Sustainable" fisheries.

CHAPTER 3

Practical Approaches and Methods for the Identification and classification of the EGSS

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2. Practical approaches and methods for the identification and the classification of the EGSS

Data on EGSS can be retrieved following two main approaches: a demand side and a supply side approach. This handbook focuses on the latter. The supply side approach is characterised by the identification of the producers of environmental goods and services. This chapter presents the methods and the main sources of information for identifying the EGSS population and some guidance on how to proceed to classify it by environmental domain.

2.1. Identifying the population

No standard statistical classification for the EGSS

The EGSS is not recognized by standard statistical nomenclatures as a distinctive sector as it is, for example, the iron and steel industry. It regroups activities from many different economic sectors. Thus, a complete and comprehensive list of the EGSS activities cannot be established *a priori* using standard statistical classifications. Therefore, the identification of the EGSS population is the first and most important step for the description and the analysis of the sector, independent of the approach chosen to gather EGSS statistics (see Chapter 4 of the Handbook).

Identification of EGSS producers and attribution to NACE

Identifying the EGSS population means to pick up the producers of environmental technologies, goods and services, as they are defined in Chapter 2 of the Handbook, from the whole economy of a country. Then the EGSS producers should be regrouped by NACE code and classified by environmental domains. The NACE classes are used further on to find and/or estimate data e.g. turnover, value added, employment and exports in/through existing statistics databases (see Chapter 4 of the Handbook). Furthermore NACE classes are used to regroup the producers in the Standard Tables for reporting data to Eurostat (see Chapter 5 of the Handbook) and to present the sector (see Chapter 6 of the Handbook).

Construction of a database of EGSS producers

Since it is not possible to identify and classify EGSS producers exhaustively using exclusively standard statistical classifications, building a database of the producers of environmental goods and services can be helpful to ensure a good coverage of the EGSS. It could include, for example, manufacturing, construction and services activities; market and non-marketed enterprises; small, medium and large enterprises; etc. The database should be continuously updated to allow for including and measuring changes in the structure of the environmental sector.

Figure 2.1 shows a procedure that can be followed to identify the population of the EGSS and build the database of the EGSS producers. It draws on the recommendation of the Environmental industry OECD/Eurostat manual and on the experience of some countries in collecting EGSS data. The different ways to search out the producers which are illustrated in Figure 2.1 and commented hereafter should be used simultaneously in order to obtain as much coverage as possible of the sector.

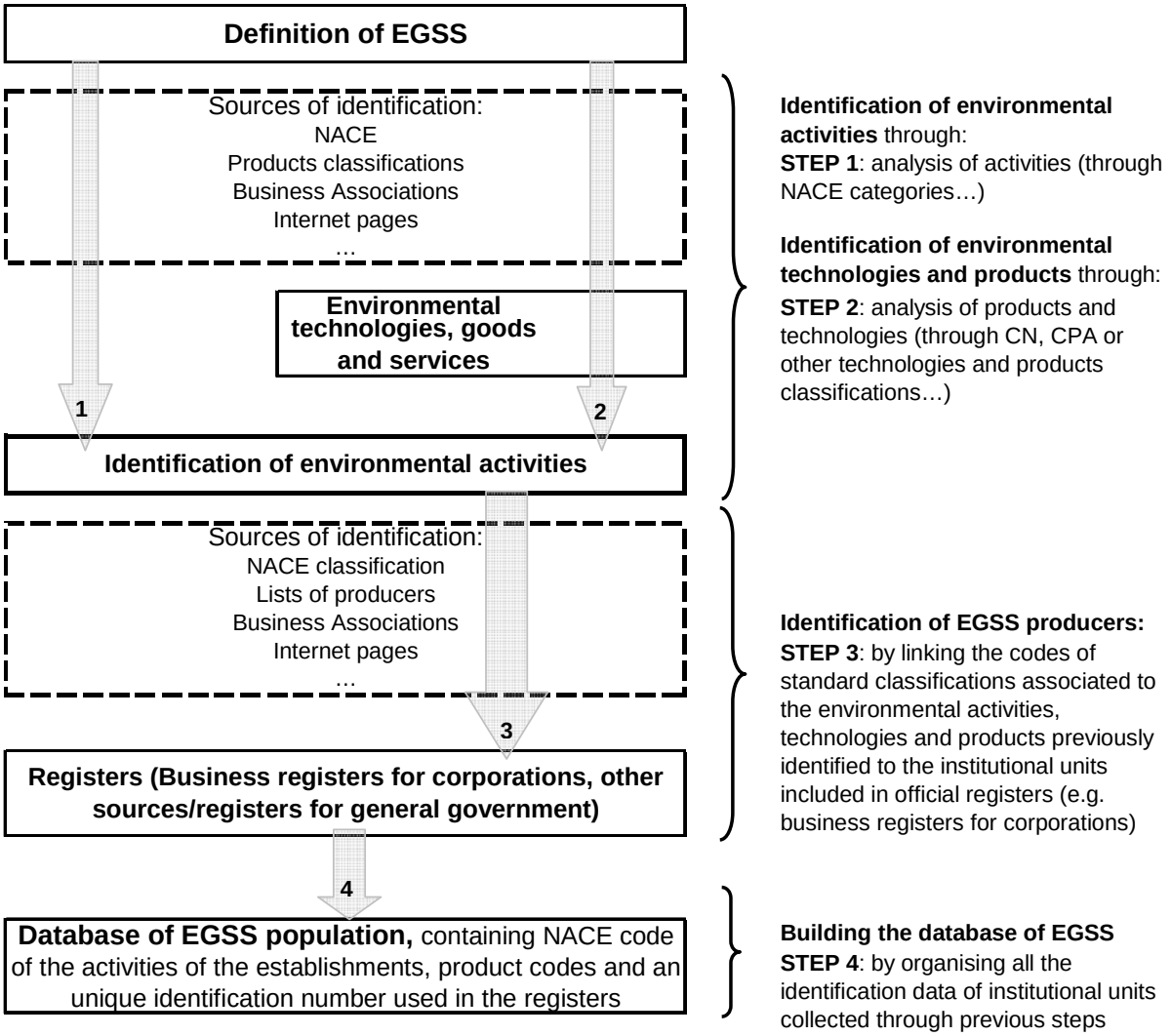

Figure 2.1 : How to identify and build a database of the population of the EGSS

A methodology to identify the population:

Following the definition and classification of environmental sector described in Chapter 2 and the examples by environmental domains presented in the Annex 2, identification of environmental producers can be obtained through the procedure in Figure 2.1.

Step 1 and step 2 are to be carried out in parallel: step 1 is particularly suited for providers of environmental specific services and step 2 for the producers of adapted goods, connected products and environmental technologies.

Step 1

Environmental producers can be identified directly through standard classifications, specialised registers and catalogues of environmental suppliers. For example, some environmental specific services (e.g. waste collection and management) are easily identified by NACE codes. This method focus on the activities carried out by the producers.

Step 2

A second way to identify EGSS producers is to select goods, services and technologies that have an environmental purpose (for example through specialised lists) and relate them to the production activities (for example through

the correspondence tables between classifications) and then to their producers through exiting lists of producers, existing goods and services statistical classifications or other sources.

Steps 1 and 2 can thus be achieved using multiple sources of information, such as picking up environmental producers using the NACE classes in the registers or picking up environmental producers in the Internet resources, industry associations lists and registers, environment trade shows and fairs, etc, looking for environmental activities or technologies and products.

Lists of technologies, goods and services to facilitate the database construction

To facilitate the steps 1 and 2, a detailed list of environmental goods, services and technologies and a detailed classification by environmental domain could be specified at a national level, on the basis of the definition and the classification of the environmental sector described in Chapter 2 of this Handbook.

For example, for the purpose of its survey on the EGSS, Germany established a list of environmental goods classified by environmental domain. The list can be found in Annex 7.

Environmental industry OECD/Eurostat Manual, WTO, SERIEE and EPEA lists of environmental technologies and products

Existing lists as the list in the Environmental industry OECD/Eurostat Manual and WTO list of environmental goods[50] should be used with caution since they contain goods falling outside the EGSS definition as it is explained in this Handbook (see Annex 6).

SERIEE and the EPEA Compilation Guide[51] contain a short list of connected products and adapted goods (see SERIEE §10032 and 10033) and some examples of facilities and equipment for the production of characteristic services (SERIEE § 10034). All these examples are contained in the Annex 2. The Handbook on environmental expenditure by industry[52] contains a list of integrated technologies (see Annex 5 of this Handbook).

Step 3

Once identified, the EGSS producers should be linked to the official source of statistical information, e.g. to the Business Registers.

Step 4

The result of this procedure is a detailed database of the population of the EGSS which contains codes of activities and products and also the unique identification number of the producer.

The procedure followed by Canada, reported in annex 4, is an example on how to put in practice the different steps of the methodology described in figure 3.1.

2.1.1. Identification of environmental activities

Identification of activities

The first way to select the producers of the EGSS is by identifying directly the environmental activities (step 1 in Figure 2.1). These activities can be found by

[50] missions on environmental goods, Informal Note by the Secretariat, TN/TE/W/63, 17 November 2005.

[51] As defined by SERIEE (§ 10031), the eco-industry comprises all the activities producing characteristic services, connected products, adapted goods and some products (i.e. "facilities") required for characteristic activities. Thus the producers of environmental specific services are exactly the same as identified by the EPEA. Eurostat, SERIEE - Environmental protection expenditure accounts - Compilation guide, Luxembourg, 2002

[52] Eurostat, Environmental expenditure statistics - Industry data collection handbook, Luxembourg, 2005

analysing whether the economic activities listed in the official standard classifications, like NACE, produce an environmental output or not. This analysis should be carried out in practice by checking whether the description of each economic activity, as reported in the standard classification, matches or not the definitions adopted in this handbook.

It is possible to select specific environmental activities through the following steps:

- identification of the key environmental issues (water use, wastewater discharge, materials consumption, waste generation, energy demand, air emissions, noise generation, etc);
- examination of the activities most relevant to address these key issues by producing technologies, goods and providing services;
- identification of codes of the standard classifications where the identified activities are currently classified;
- identification of those activities which are carried out in the country.

This procedure is most suited for providers of environmental specific services. *For example*, architectural and engineering services provide sometimes environmental analysis and technical testing. These kind of services are classified in the NACE 71 "technical testing and analyses" that includes "testing and measuring of environmental indicators".

The NACE classification

Step 1 can be easily accomplished for those specific environmental activities which can be distinguished through existing nomenclatures for the classifications of economic activities, e.g. the NACE.

In the NACE classification some labels clearly refer to environmental activities. Indeed, the NACE Rev. 2, explicitly considers a number of environmental activities as separate groups or subgroups. In these classes, the corporations produce technologies, goods and services for an environmental or Resources Management purpose only. Moreover, it is clear in the explanatory notes of these classes that it does not concern distribution or production of non-environmental components, which are not included in the EGSS. Thus, the producers of these NACE classes are undertaking an activity considered as environmental in its entirety.

Examples of typical NACE classes entirely environmental

These corporations consist of NACE 37 "sewerage", NACE 38 "waste collection, treatment and disposal activities, materials recovery" and NACE 39 "remediation activities and other waste management".

National versions of NACE

Moreover, some national versions of NACE provide a more detailed classification of activities, specifying other typical environmental activities. For example, the Norwegian version of NACE Rev 2, has some extensions to 5-digit level containing activities entirely environmental. For example, Norway has split the NACE 35.11 Production of electricity in 5 sub-groups (35.111: Production of electricity from hydro power; 35.112: Production of electricity from wind power; 35.113: Production of electricity from bio-fuels, waste and deposit gases; 35.114: Production of electricity from natural gas; 35.119: Production of electricity from other sources, e.g. wave power, tidal power, etc). The national NACE in Norway allows to identify producers of renewable energy through the codes 35.111, 35.112 and part of 35.113 and 35.119.

However, most of the EGSS activities are scattered across NACE groups and subgroups whose activities do not produce exclusively environmental technologies and products.

An example is the production of renewable energy. The depletion of fossil energy sources could be prevented by the production of energy from other sources, i.e. renewable energy. Renewable energy is an adapted good and all technologies used in the production of renewable energy are “resource-efficient” technologies (integrated technologies). The producers of renewable energy are classified within NACE 35.11 “Production of electricity,” together with producers of non-renewable energy. The producers of integrated technologies for the production of renewable energy and its components (connected goods) can be found scattered in the NACE C, Manufacturing.

Identification of secondary activities

Following the NACE 2 Introductory Guidelines (§ 68), if a unit performs activities falling in only two different NACE categories the activity that represents more than 50% of the value added is the principal activity and determines the NACE Rev. 2 classification of the unit.

Some environmental activities, mostly secondary activities but even principal activities, are not specifically labelled, are regrouped in a general NACE section or can not be identified through NACE classes due to the fact that the registers contain the NACE of the principal activity only (the principal activity not being environmental and the secondary ones being environmental). This is the case of vertically integrated industries.

For this kind of producers (vertically integrated industries whose principal activity is not an environmental one), NACE classification does not allow for a simple identification of units producing environmental technologies, goods or services.

For example, the main activities of producers in the NACE 36, “collection, purification and distribution of water”, should not to be included in the EGSS since collection, potabilisation and distribution of water are not environmental protection or Resource Management activities according to the definition of EGSS. Nevertheless NACE 36 could include environmental activities as the management of water resources (e.g. the reduction of water losses in waterworks) carried out as secondary activities.

Some of these producers can be found by analyzing specialised registers and catalogues of suppliers as well as using business associations’ registers.

For example, in the case of organic farmers, usually lists of producers can be obtained by specialized business associations. Another ways to identify organic farmers could be to look for farmers receiving subsidies, given the fact that organic farming is likely to be subsidised or to search for farmers with an organic farming label at European[53] or national level (as it is the case in the Netherlands).

Complementarily, the identification of EGSS population can be carried out through the identification of environmental technologies, goods and services, as described by step 2.

[53] In March 2000 the European Commission introduced a logo bearing the words 'Organic Farming - EC Control System' [Regulation (EEC) No 2092/91] to be used on a voluntary basis by producers whose systems and products have been found on inspection to satisfy EU regulations.

The standard tables contain a sheet with some examples of environmental technologies and products that can be found in each NACE class[54].

2.1.2. Identification of environmental technologies, goods and services

Identification of producers by searching for environmental technologies, goods or services

In order to obtain a good coverage of the EGSS, population can be identified by selecting particular environmental technologies, goods and services (step 2 in Figure 2.1).

Identification of environmental specific services, connected products and end-of-pipe technologies

To identify and select environmental specific services, connected products and end-of-pipe technologies, the following steps can be followed:

- identification of the key environmental issues (water use, wastewater discharge, materials consumption, waste generation, energy demand, air emissions, noise generation, etc);
- examination of the technologies, goods or services most relevant to address these key issues, which are distinct and identifiable at the end or outside the process which generates the environmental impacts;
- identification of those technologies, goods or services which are produced in the country;
- identification of codes of the standard classifications where the identified technologies, goods and services are classified;
- elaboration of a list of these technologies, goods and services which should be updated each year.

For example, scrubbers are produced in order to treat and correct air emissions at the end of the generation process. If scrubbers are produced in the country, these should be included in the list of end of pipe technologies.

Exhaust pipes and silencers for motor vehicles are produced in order to treat and correct vehicles' air emissions and noise at the end of the generation process. If exhaust pipes or silencers for motor vehicles are produced in the country, these should be included in the list of connected goods.

Wastewater services are produced in order to treat and correct water emissions. If these services are provided in the country, they should be included in the list of environmental services.

Identification of integrated technologies and adapted goods

Identification of integrated technologies and adapted goods

In the case of adapted goods and integrated technologies, a reference (standard) is needed to identify what could be considered as cleaner or resource-efficient.

The particularity of an adapted good and integrated technology is that, as soon as it is considered as a standard, it is no more a "cleaner" or resource efficient technology or good and therefore it is no more in the EGSS scope. Furthermore a

[54] Although it is not an exhaustive list, the examples in this sheet of the standard tables should be regarded as a starting point which can be further completed and improved.

technology or good could be a standard in a country but a “cleaner” or “resource efficient” one in another. Thus, any list of adapted goods and integrated technologies would shift over time and space.

Identification of integrated technologies

To identify and select integrated technologies, it is recommended to use an iterative process involving the following steps:

- identify the key environmental issues (water use, wastewater discharge, materials consumption, waste generation, energy demand, air emissions, noise generation, etc) for each activity at the level of NACE 2 and 4-digits;
- examine the technologies in the production process most relevant to address these key issues;
- identify by sector the technology with the best environmental performance levels, compared to the reference, on the basis of the available data at national level, in the European Union and world-wide;
- identify those technologies which are produced in the country;
- identify the codes of the standard classifications where the identified technologies are currently classified;
- elaborate and update regularly a list of integrated technologies which allows further the identification of their producers.

Examples of cleaner or resource-efficient technologies

For example, the cement manufacture consumes a lot of energy due to the use of wet process. An energy saving technology, dry process, is available but has not been still adopted by the most part of the sector (i.e. it is not a standard yet). This technology is therefore considered as a “resource efficient” technology and its producers should be found in the manufacture of equipments sector.

Annex 6 contains some other examples on integrated technologies.

Identification of adapted goods

To identify and select adapted goods, it is recommended to:

- identify “leading market edges” consumer goods;
- identify groups of goods with the greatest environmental impacts during their production or consumption and/or scrapping[55];
- examine for each group the most relevant goods with the best environmental performance levels, on the basis of objective parameters such as composition (e.g. the renewable or non toxic character of components) and/or environmental performance (e.g. energy consumption, efficiency, recyclability/bio-degradability, low/zero pollution) using the available data at national level;
- measure ‘leading market edges’ for each consumer good and estimate the part which is considered as the ‘leading green edge’ of the market, based on current standards;
- identify which of these leading green goods are produced in the country;

[55] For example, the European project IMPRO - Environmental Improvement of Products - provides a list in the framework of an Integrated Product Policy that can be used for identifying these groups of goods (http://ec.europa.eu/environment/ipp/identifying.htm).

- identify the codes of the standard classifications where the identified goods are currently classified;

- elaborate and update regularly a list of adapted goods.

For example, compact fluorescent lamps are to be considered as adapted goods since they represent the best available lighting good on the market for reducing energy consumption from lighting.

NOTE: Another way to identify adapted goods is to rely upon the existing "eco-labels". Goods which comply with the standards set by an eco-label or which fall in the top-class of an eco-label can be included in the list. The advantage of such a rule-of-thumb is the user-friendliness. The disadvantage is that for certain goods standards set by eco-labels are too wide, allowing for the incorporation of most of the production of a good and thus not allowing for the identification of leading green goods. Annex 7 deals with the use of eco-labels for identifying adapted goods.

The results of the Community Innovation Survey[56] is another source of information that can be used to identify and update environmental technologies, goods and services at national level. In fact, the results of this survey allow to identify producers of innovative technologies, goods and services with reduced materials and energy per unit output and/or reduced environmental impacts.

[56] The Community Innovation Survey (CIS) is a survey conducted by EU member states that allows the monitoring of Europe's progress in the area of innovation. The survey was originally conducted every four years, but since 2005 has been conducted every two. This survey collects information about product and process innovation as well as organisational and marketing innovation.

Classification of environmental technologies, goods and services

Classification of technologies, goods or services

Technologies, goods or services classifications and nomenclatures are of valuable help to select environmental technology, good or service which are easily distinguishable from their label.

The Classification of Products by Activity

The Classification of Products by Activity[57] (CPA) is the European version of the Central Product Classification (CPC) of the United Nations[58].

It is a complete product classification covering goods and services. Each type of good or service distinguished in the CPA is defined in such a way that it is normally produced by only one activity as defined in the NACE Classification of all economic activities. The link between CPA and NACE classification appears in the codes: the first four digits of any CPA code are equal to the 4-digits code of the corresponding NACE level.

CPA presents categories for all products that can be the object of domestic or international transactions or that can be entered into stocks. It includes goods and services that are an output of economic activity, including transportable goods, non-transportable goods and services.

For example, the construction of water treatment and sewage disposal plants are classified in the CPA 42.21.23. Other examples are the CPA 71.11.31 “urban planning services” which includes, among others, studies of environmental impacts of urban development plans and the CPA 71.12.15 “engineering services for waste management projects”.

The Belgian Environmental Industry report[59] contains a list of environmental goods classified by the CPA. The list draws from the OECD list of environmental goods. It is organised by CPA codes and contains for each entry also the environmental domain to which the product is allocated (following the Environmental industry OECD/EUROSTAT manual).

The Harmonised System and Combined Nomenclature

The Harmonized System (HS) is an United Nations goods classification that takes into account the basic categories of economic supply and use as specified in the System of National Accounts (SNA), such as intermediate consumption, final consumption, capital formation and imports and exports. Even if the HS should concern only goods, it includes also the physical manifestation of services (e.g. the projects of an engineer or of an architect). The HS is a classification of goods by criteria based on raw materials and the stage of production of commodities. HS uses primarily the physical property criterion for classifying goods.

Combined Nomenclature (CN) is the classification used within the European Union for collecting and processing foreign trade data, based on the HS classification. CN classification is more detailed than its reference adding further two digits to the six digits HS codes60.

For example, silencers mufflers and exhaust pipes are identified by the code HS 870892.

[57] CPA is a classification based on the physical characteristics of goods or on the nature of the services rendered.
[58] A new version of the CPA has been adopted in 2008.
[59] Federal Planning Bureau, (2007), “The Belgian Environment Industry (1995-2005)”, annex 3
[60] The last version of the HS is the one finalised in 2007. The versions of CN 2007 and 2008 are consistent with this last version of HS.

PRODCOM is a system for the collection and dissemination of statistics on the production of manufactured goods, which consists of about 4500 headings. Each heading has an 8-digit code based on the first 4-digits of NACE in which the producing enterprise is normally classified and the first 6-digits of the CPA[61] supplemented by 2 extra digits which normally correspond to the Combined Nomenclature (CN).

For example, Germany carries out a survey of goods, construction work and services for environmental protection. The population was build up by identifying local units in the German business register that produce environmental goods according to the PRODCOM-list (Annex 6).

For example, compact fluorescent lamps (adapted goods) can be identified by the PRODCOM and CPA code 27.40.15 (NACE 27.40 manufacture of electric lighting equipments). Multiple walled insulating units of glass, that is glass used for double windows for heat saving or noise reduction purposes, are identified by the code PRODCOM and CPA 23.12.13. (NACE 23.12 Shaping and processing of flat glass).

2.1.3. Link between technologies, goods, services, activities and the producers

Link between environmental goods, services and technologies and lists of establishments

Step 3 of the procedure described in Figure 2.1 concerns the identification of the environmental producers in existing registers using activities or technologies and products codes by a register code at the establishments level.

Once environmental activities have been selected (step 1), they can be related to a list of establishments which carry out such activities.

Link between environmental goods, services and technologies and the producers NACE code

Once those environmental technologies, goods and services have been selected (step 2), they can be related to a correspondent code of an existing classification and then to lists of enterprises or establishments which produce such technology, good or service. *For example*, the business registers contain establishments classified by NACE. Other registers contain establishments classified by product code, such as the PRODCOM statistics.

Technologies, goods or services classifications are then a valuable help in finding the economic activity producing it, as it is linked to classification of activities via correspondence tables[62], as it is shown in Figure 3.2.

For example, the equipments of the CN 8708 92 are silencers mufflers and exhaust pipes. These ones are linked to the CPA 29.32.30 “parts and accessories for motor vehicles” and therefore are produced by the NACE 29.32 “manufacture of other parts and accessories for motor vehicles”.

The database built in this way, will allow the compilation of statistics on principal and secondary activities of market and non market corporations.

[61] As PRODCOM is based on NACE and CPA classifications, the system has been updated to remain consistent with the new versions of 2008.

[62] Correspondence tables are available on the Eurostat website: http://ec.europa.eu/eurostat/ramon/relations/index.cfm?TargetUrl=LST_REL

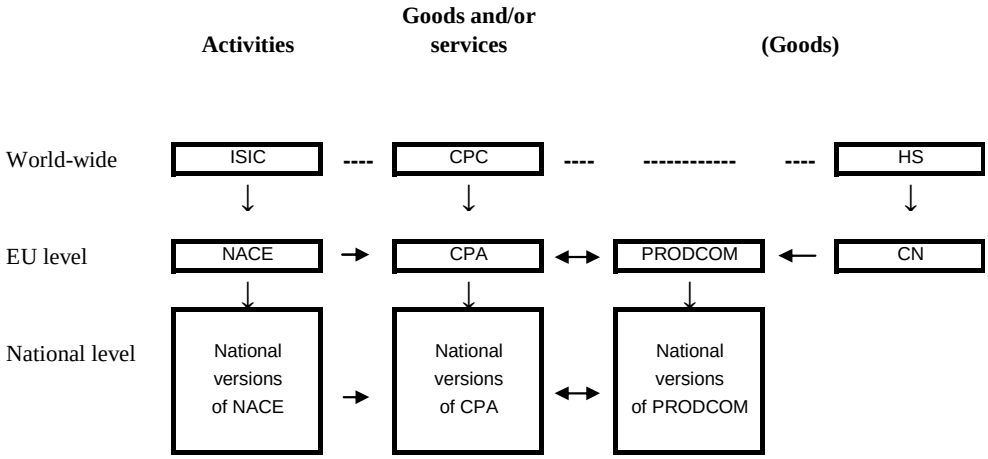

Figure 2.2 : Links between the different classifications of activities, technologies and products

NOTE: The procedure described in this chapter can lead to the identification of companies carrying out several activities, some inside the definition of the EGSS, some others outside. In addition, several establishments within one company can differ in terms of environmental domains and NACE classifications. For these reasons, the database should ideally describe producers of the EGSS on the basis of local KAU. The focus on local KAU helps to find out the establishments that just take into account the environmental activities of the companies. Moreover, if the company carries out activities entirely environmental (identified by a clear NACE code, as explained above), all the establishments can be considered as entirely environmental.

It can happen that, depending on the available information, the analyses conducted in the first steps of the suggested method could lead only to the identification of wider categories of activities, technologies or products where EGSS units fall together with non-EGSS units. Such situations can occur and they lead to a non-exhaustive identification of the EGSS population. In these cases a preliminary survey to identify exhaustively the population could be carried out for a more detailed identification.

EP Ancillary activities

For ancillary activities, another method for compiling statistics will be used where the establishments are unknown. In the case of Environmental Protection (EP) ancillary activities, the EPEA can directly give the information on the NACE sectors and magnitude of EP ancillary activities (see chapter 4 for the derivation of e.g. turnover of ancillary EP activities).

RM Ancillary activities: the case of auto production of renewable energy

In the case of Resources Management (RM) ancillary activities, one of the most important activities is the auto production of renewable energy. Some industrial activities can cover most of their energy need by the auto production of renewable energy. This is the case for example of the food industry and the paper industry. When energy statistics on auto production of energy give the detail of the energy produced by source, they can directly give the information on the NACE sectors and magnitude of a great part of RM ancillary activities (see chapter 4 for the derivation of e.g. turnover of ancillary RM activities).

2.1.4. The list of EGSS producers

Compilation of the list of EGSS producers

Once the population has been identified, it is recommended that, wherever possible, the correspondences with standard statistics be established (e.g. enterprises and establishments are normally classified with an unique code number which links them to the main standard industrial classifications and registers).

It is recommended to allocate to each establishment of the population the categories/codes of the national classifications and the European Statistical Classifications and Nomenclatures. In such a way, some information can be derived. This will also improve the quality of the data and facilitate analysis and further data compilation.

NACE	Activity	Establishment	Identification number (e.g. business register)	Technology or Product	Environmental domain
…	…	…	…	…	…
22.11	Principal and market	"Pincopallino" retreading	293907	N/A	CReMA 13C
23.11	Ancillary and non-market	"Pincopallino" Glass	257990	23.12.13	CReMA 14
27.50	Secondary and market	"Pincopallino" Lights	333333	27.50.15.xx	CReMA 13B
39	Principal and non-market	"Pincopallino" Waste	453563	N/A	CEPA 3
…	…	…	…	…	…

Table 2.1 : Example of a preliminary list of EGSS producers

The last step of the procedure depicted in Figure 2.1 (step 4) is to compile in a database the list of producers (establishments) with all these codes that form the population of corporations. In order to facilitate the data collection, a unique identification number for each establishment (which will allow to find it in all registers) should also be added (see example in Table 3.1). The environmental technologies and products of the establishments can be detailed. The environmental domains related to the technologies and products can also be introduced by establishment in the database. The procedure to attribute the environmental domain to technologies and products is explained in Chapter 3.2 hereafter.

2.2. Recommendations for the classification of activities by environmental domains

The most part of EGSS activities are easily classified by environmental domains on the basis of their environmental purpose.

For example, the NACE 24.4 “manufacture of basic precious and other non-ferrous metals” includes the activities of producing metals from electrolytic refining of metals waste and scrap (aluminium, copper, zinc, etc). These activities, which clearly aim at the reduction of the intake of raw materials, produce adapted goods (i.e. metals from metal waste and scrap) which are classified in the CReMA 14 “management of minerals”.

Another example is the construction of passive and low-energy buildings (adapted goods) by the NACE 41 “construction”. The main environmental purpose of these buildings is to save energy/heat. Therefore, these adapted goods should be classified in the CReMA 13B “heat and energy saving”.

Classification of technologies and products concerning two or more domains

Some technologies and products are related to more than one domain of the Environmental Protection, more than one domain of the natural Resource Management or both Environmental Protection and Resource Management domains. It is the case for example of most part of integrated technologies and adapted goods that prevent or reduce pollution and/or the intake of natural resources.

For statistical purposes, technologies and products classification should be made in the main domain according to the main purpose and taking into account the technical nature as well as the producer’s intention. Multi-purpose activities and products that address several CEPA and/or CReMA classes should be classified in the main domain.

Renewable energy simultaneously prevents air emissions and natural resources depletion. By convention, all activities related to the protection of ambient air and climate through the reduction of natural resources use should be classified in the natural Resources Management group. In this case, the producers of renewable energy will be classified in the CReMA 13 class, the management of energy resources, which includes a subclass, CReMA 13A, for the production of energy from renewable sources.

Recommendations for climate change prevention activities

Activities aiming at fighting climate change can be classified in four different classes: activities treating or avoiding greenhouse gas emissions (e.g. the producers of filters or low CO2 emissions goods for example), which are part of CEPA 1; activities for the production of renewable energy (e.g. the producers of renewable energy as well as wind mills for example), which are part of CReMA 13; research activities for the protection of climate, which are part of CEPA 9 and research activities for promoting renewable energy production, which are part of the CReMA 15. Standard tables allow for the separate identification and classification of such activities in order to be able to present aggregate data for the part of the EGSS that is devoted to fighting climate change.

Recommendations for recycling activities

According to CEPA recycling is seen as a production chain, made up of two main parts: the upstream part consists of production processes and technologies for the collection and treatment of waste and consequently should be classified within CEPA 3 (the main purpose is sorting and treating waste streams for reuse); the downstream part consists of production processes and technologies for the transformation of waste into secondary raw materials or final goods (the main purpose is reduce the use of resources) and then should not be classified in the environmental protection group but in the Resource Management group (see fig. 3.3).

Recycling activities are included within CEPA 3 only to the extent that they constitute a substitute for waste management. This means in practice that only

the activities and technologies for the collection and treatment of waste are classified within CEPA 3 (for example, equipments for sorting waste which are end of pipe technologies); the output of these activities is a (waste management) service. On the contrary activities for producing recycled materials and products are excluded from CEPA and belong to the CReMA scope (equipments for transforming the waste recovered into secondary raw materials or final goods which are resource-efficient technologies).

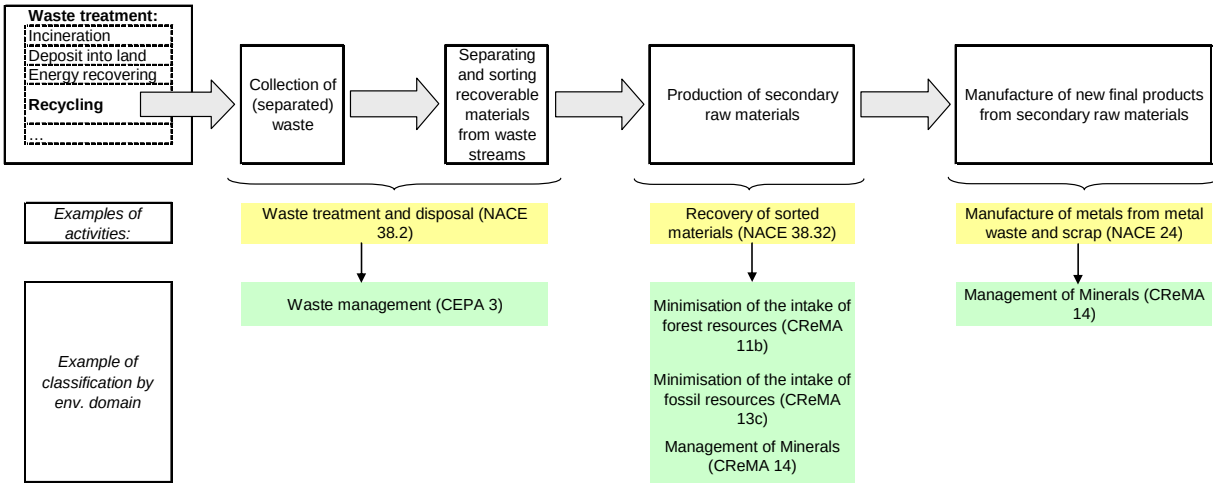

Figure 3.3 : Recycling activities: distinction between environmental protection and natural Resources Management

Thus, the part of the recycling activities which concern collection and treatment of waste should be classified within the CEPA 3 (waste management). However, the group of environmental protection activities excludes manufacture of secondary raw material or goods from waste and scrap. Secondary raw materials (and also goods made from secondary raw materials) are considered as environmental goods in the domain of Resource Management since they aim at the reduction of the intake of raw materials and thus avoiding resource use.

Classification of recycled goods

Producers of recycled wood goods and recycled paper are classified in the CReMA 11B (minimisation of the intake of forests resources); producers of recycled glass, metal, ceramic goods are classified in the CReMA 14 (management of minerals) and producers of recycled plastic goods are classified in the CReMA 13C (minimisation of the intake of fossil resources as raw material for other use than energy production).

Recommendations for waste incineration

Waste incineration is included in CEPA 3 (waste management) when the purpose of the facilities is the thermal treatment of waste (waste management services). With regards to biomass waste incineration when the purpose of the facilities is energy recovery (mainly in the manufacturing sector), it is included in CRUMA 13A, (production of energy from renewable energy).

Recommendations for protection of biodiversity and management of wild flora and fauna

CEPA 6 relates to the protection of biodiversity that concerns for example threatened species. In the field of the management of wild flora and fauna resources (CReMA 12), the stock of e.g. fish and wild animals for hunting is relevant. Examples of producers in this field are governmental agencies providing authorisation and establishing quota for fishing and hunting.

Recommendations for urban planning activities

Urban planning activities often take into account also sustainable development issues. In this case the part of the activity which can be recorded in the EGSS is

the part which is covered by the definition of the EGSS. This can be the case of urban planning activities which mainly address the protection of landscapes and biodiversity (CEPA 6) issue or activities which mainly address the reduction of energy consumption (CReMA 13B).

Some examples and recommendations for the classification in environmental domains are provided in Annex 2, 10 and in the corporations' example sheet of the Standard Tables.

Annex 3. Correspondence tables between NACE 1.1 and NACE 2

According to this NACE Rev 2, replacing the NACE Rev 1.1, the activities related to the environmental management have been re-categorised. Table A.1 gives an overview of the correspondence between NACE Rev. 1.1 and NACE 2.

ISIC Rev. 3.1 – NACE Rev. 1.1		ISIC Rev. 4 – NACE Rev. 2	
Section	Description	Section	Description
A	Agriculture, Hunting and Forestry	**A**	Agriculture, Forestry and Fishing
B	Fishing		
C	Mining and quarrying	**B**	Mining and quarrying
D	Manufacturing	**C**	Manufacturing
E	Electricity, gas and water supply	**D**	Electricity, gas, steam and air conditioning supply
		E	Water supply, sewerage, waste management and remediation activities
F	Construction	**F**	Construction
G	Wholesale and retail trade: repair of motor vehicles, motorcycles and personal and household goods	**G**	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Hotels and restaurants	**I**	Accommodation and food service activities
I	Transport, storage and communications	**H**	Transportation and storage
		J	Information and communication
J	Financial intermediation	**K**	Financial and insurance activities
K	Real estate, renting and business activities	**L**	Real estate activities
		M	Professional, scientific and technical activities
		N	Administrative and support service activities
L	Public Administration and defense; compulsory social security	**O**	Public administration and defence; compulsory social security
M	Education	**P**	Education
N	Health and social work	**Q**	Human health and social work activities
O	Other community, social and personal services activities	**R**	Arts, entertainment and recreation
		S	Other service activities

P	Activities of private households as employers and undifferentiated production activities of private households	**T**	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
Q	Extraterritorial organizations and bodies	**U**	Activities of extraterritorial organizations and bodies

Table A3.1 : Correspondence table between NACE Rev. 1.1 and NACE 2

A new category (NACE E) will regroup most of the environmental activities that were classified through NACE 41, 90, 37 or other business activities. Table A.2 gives the correspondence between the NACE 1.1 and NACE 2 of “environmental” classes (i.e. classes containing almost only environmental activities).

NACE Rev 1.1	Detailed description	NACE 2	Detailed description	Comments
2330	Processing of nuclear fuel	3812	Collection of hazardous waste	Collection and treatment of radioactive nuclear waste
2330	Processing of nuclear fuel	3822	Treatment and disposal of hazardous waste	Includes: - treatment, disposal and storage of radioactive nuclear waste including: - treatment and disposal of transition radioactive waste, i.e. decaying within the period of transport, from hospitals - encapsulation, preparation and other treatment of nuclear waste for storage
2512	Retreading and rebuilding of rubber tyres	2211	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres	Aggregation of NACE Rev. 1.1 classes 25.11 and 25.12
3710	Recycling of metal waste and scrap	3831	Dismantling of wrecks	Includes: - dismantling of automobiles
3710	Recycling of metal waste and scrap	3832	Recovery of sorted materials	Includes: - reclaiming metals out of photographic waste, e.g. fixer solution or photographic films and paper
3720	Recycling of non-metal waste and scrap	3832	Recovery of sorted materials	All
9001	Collection and treatment of sewage	3700	Sewerage	
9002	Collection and treatment of other waste	3811	Collection of non-hazardous waste	Collection of non-hazardous waste
9002	Collection and treatment of other waste	3812	Collection of hazardous waste	Collection of hazardous waste
9002	Collection and treatment of other waste	3821	Treatment and disposal of non-hazardous waste	Treatment and disposal of non-hazardous waste Production of compost from organic waste
9002	Collection and treatment of other waste	3822	Treatment and disposal of hazardous waste	Treatment and disposal of hazardous waste
9003	Sanitation, remediation and similar activities	3811	Collection of non-hazardous waste	Collection of refuse in litter-bins in public places
9003	Sanitation, remediation and similar activities	3900	Remediation activities and other waste management services	Decontamination of soils and groundwater at the place of pollution, either in situ or ex situ, using mechanical, chemical or biological methods. Decontamination and cleaning up of surface water following accidental pollution, e.g. through collection of pollutants or through application of chemicals Cleaning up oil spills on land, in surface water, in oceans and seas - including coastal seas. Clearing of mines and the like (including detonation) Other specialized pollution control activities n.e.c.

Table A3.1 : Correspondence of “environmental” activities between NACE Rev. 1.1 and NACE 2

Annex 4. Sources of information to be used for identifying the population: examples from countries

In order to build up the EGSS population, different sources can be used. Following paragraphs present the experiences from countries.

The Netherlands

Statistics Netherlands constructs an indicative database of environmental producers of goods and services using various sources, such as the Business Register, business associations, Internet searches with use of keywords, telephone directory and the yellow pages. No environmental sector specific survey is held in the Netherlands.

By using this framework, Statistics Netherlands especially works to identify the producers of technologies and environmental consultancy services using the following criteria: an enterprise belongs to the environmental sector if an enterprise is a member of an environmental related business association and/or an enterprise is categorised into the group “environment” in the yellow pages.

Different steps are then followed:

- Identify enterprise belonging to “business association” or “yellow pages”
- Identify postal code and number of these enterprises
- Try to find the enterprise in the Business Register
- Once the producer is identified in the business register, it is possible to collect variables of interest (NACE class, employment, turnover, exports, value added) and to classify them by environmental activities (air pollution control, wastewater management, and so on)
- Aggregate enterprises into a specific environmental activity and NACE class

Sweden

Statistics Sweden has built a database containing the EGSS population. Every establishment in the database is classified in NACE codes and in environmental domains. The information on NACE codes is collected from the Business Register and the environmental domain is decided upon the description of the activities of the establishment (or company) and the correspondence to the environmental domains specified in the Environmental industry OECD/Eurostat manual.

Until 2002 the database was based on whole enterprises. From 2002, Statistics Sweden started to focus on establishments. The reason for this is that one company can carry out quite diverse activities, some within the definition of environmental sector and some outside the definition. In addition, two establishments within one company can differ in terms of environmental domains and NACE classification. In short, better precision can be reached when focusing on establishments instead of whole companies. Today, the Swedish EGSS database contains around 13000 establishments belonging to roughly 10000 companies.

The method used by Statistics Sweden can generally be described in three different steps:

- Identification of the population. The entirely environmental industries (entire NACE classes) are directly identified from Business Register by NACE-code. The other establishments are identified, as in The Netherlands, by lists and databases, e.g. lists from trade associations, yellow pages, websites, etc.

  Once the establishments are identified, they are specified by a unique identification number in the Business Register. This is necessary to be able to link them to other sources of information in order to get information on variables such as turnover, employment, etc.

- Classification. The second step is to classify the establishments according to the environmental domain the establishment is active in and then according to which degree the establishment is active within the definition. Here, a primary group and a secondary group have been established. The first group is estimated to be more than 50% active within the definition of environmental sector and the second group is less than 50% active within the definition of environmental sector, although it is an important part of their business activity.

- Link. The last step is to link the identified establishments to other data sources to get information on employment, turnover, exports, etc. Thanks to the identification numbers for the establishments there is a wide range of different information that can be linked to.

Canada

Through consultation of various government and private sector data users, Statistics Canada identified an extensive list of products and services that are used in environmental protection. These products and services were linked to the businesses most likely producing / supplying them in the NAICS[63], mostly at the six digit level of the classification.

These key NAICS categories were then sampled in a two stage process. Initially, a first sample of some 6,000 units (above a cut off of $1 million revenue) was drawn from all available units (above the size cut off) within the eligible NAICS. These units were the subject of a telephone survey to establish their nature of business and to place them within scope or out of scope for the survey. Subsequently, all in scope units from stage one were sampled a second time and it is estimated that approximately 1000 establishments were identified to receive the full paper survey questionnaire (stage two).

Statistics Canada researcged external sources to identify businesses that have self-identified as being producers or importers of environmental goods and services. These businesses were then linked to the central business register and were included in the stage two mail out.

After collection and receipt of the final data file, estimates were prepared for each of the sampled NAICS. These estimates were combined with information derived from another Statistics Canada survey on the waste management industry and results from Services Division surveys on environmental engineering and environmental consultants, and final results compiled.

[63] North American Industry Classification System (NAICS) is the equivalent of NACE for Canada.

Annex 5. Identification of integrated technologies and adapted goods: some examples.

This annex provides some examples of how to identify integrated technologies and adapted goods. It contains some examples of integrated technologies used in the manufacturing industry. It contains the definition of renewable energy and organic farming goods (adapted goods). Finally the annex presents a methodology to find data on some adapted goods through the use of energy-labels and eco-labels.

Integrated technologies in the manufacturing industry

The 'integrated' technologies used (and produced) by the manufacturing industry are technologies that prevent pollutants being generated during the production process as well as resource-efficient production processes. They include methods, practices, processes or equipment designed for preserving natural resources or for preventing or reducing the pollution created at the source thereby by reducing the environmental impacts associated with the release of pollutants and/or polluting activities.

Examples of integrated technologies can be found in the Eurostat Handbook on environmental expenditure by Industry[64]. Table A.3 contains these integrated technologies, which refers exclusively to the environmental protection group, i.e. these are cleaner technologies, and some hints on how to find their producers. When the list refers to easily identifiable equipments, the possible producers are listed. When the list refers to methods, processes and practices, the producer is usually the activity using the method, process and practice. In this case the integrated technology is an ancillary activity and the column "producers" points out the economic sector where to find it.

Integrated technologies: cleaner technologies	Producers
Protection of ambient air and climate	
Biological cleaning system	NACE C – chemical industry
Cars with environmental friendly cooling	NACE C – equipments industry
Catalyst exchange/purifier	NACE C – chemical industry
Catalytic NOx purifier	NACE C – chemical industry
Central refrigerating plant using ammonia replaced by smaller refrigerating plant	NACE C – equipments industry
Changing cooling system to indirect refrigerator	NACE C – equipments industry
CO and NOx optimisation	NACE C – equipments industry
Cold storage, flooring, and heating recycling	NACE C – equipments industry
Compressor exchange for more environmental friendly cooling material	NACE C – equipments industry
Compressor switchover. Change of cooling material for dryer	NACE C – equipments industry
Computer steering of furnace facility in factory	NACE C – equipments industry
Conversion of CFC/R-12 units	NACE C – equipments industry
Conversion of furnace from oil to electricity	NACE C – equipments industry
Conversion of refrigerator compressor	NACE C – equipments industry
Cooling compressor	NACE C – equipments industry
Cooling facility	NACE C – equipments industry
Cooling investment, liquidation of freon	NACE C – equipments industry
Distant cooling system	NACE C – equipments industry
Distant cooling system that replaces cooling unit with R22	NACE C – equipments industry
Distant heating culvert	NACE C – equipments industry
Enclosed processes by BTG manufacturing	NACE C – equipments industry

[64] Eurostat, 2005, "Environmental expenditure statistics: Industry data collection handbook".

Integrated technologies: cleaner technologies	Producers
Exchange of cooling agent	NACE C – equipments industry
Exchange of cooling material	NACE C – equipments industry
Exchange of cooling material in air conditioning and test chamber	NACE C – equipments industry
Exchange of cooling material in cooling system	NACE C – equipments industry
Exchange of cooling system to NH3	NACE C – equipments industry
Exchange of fire extinguisher	NACE C – equipments industry
Exchange of material in refrigerator	NACE C – equipments industry
Exchange of R22 inside air conditioning unit	NACE C – equipments industry
Exchange of refrigerating machine and material in the machine	NACE C – equipments industry
Exchange of solvent based cleaning equipment to water based	NACE C – equipments industry
Exchange of waterborne paint	NACE C – chemical industry
Exchanging air conditioner unit with R22	NACE C – equipments industry
Exchanging material in cooling system	NACE C – equipments industry
Floating covers and coverings for tanks and other storage areas.	NACE C – equipments industry
Flue gas operation control of furnace, central	NACE C – equipments industry
Fog separator for turning lathe	NACE C – equipments industry
Frequency control of ventilation in evaporation facility	NACE C – equipments industry
Furnace rebuilt for better burning	NACE C – equipments industry
Grounding with UV varnish	NACE C – equipments industry
Heat exchanger	NACE C – equipments industry
Hot water accumulator for improved low cargo management	NACE C – equipments industry
Improved density testing equipment for SF6 gases	NACE C – equipments industry
Installation of equipment for NOx reduction	NACE C – equipments industry
Installation of low NOx burner for oil-heated furnace	NACE C – equipments industry
Insulation of ovens	NACE C – chemical industry
Liquidation of cooling machines containing R22	
Liquidation of ethylene oxide sterilization	
Liquidation of Freon	
Liquidation of trichloroethylene	
Machine for recycling air	NACE C – equipments industry
New condenser (ammonia cooler)	NACE C – equipments industry
New evaporation line	NACE C – equipments industry
New heat pump	NACE C – equipments industry
New pump equipment to use more environmental friendly under sealing	NACE C – equipments industry
New washing technique based on alcohol	NACE C – equipments industry
NOx burning chamber. Gas turbine	NACE C – equipments industry
Operating management of furnace	
Pellet furnace	NACE C – equipments industry
Purchase of electrostatic equipment for reducing paint usage when lacquering	NACE C – equipments industry
Rebuilding of bark furnace to improve efficiency level and to reduce NOx emissions	NACE C – equipments industry
Rebuilding of primary air regulator on bio furnace	NACE C – equipments industry
Rebuilding of ventilation and air purifier plant at the department for lacquering	NACE C – equipments industry
Reduced amount of Freon	
Reduced dust discharge of furnace, central	NACE C – equipments industry
Refrigerating compressor	NACE C – equipments industry
Refrigerator with ammonia as cooling agent. Replacing old refrigerators containing HCFC	NACE C – equipments industry
Repealed CFC cooling unit	NACE C – equipments industry
Replacement of cooling material with a cyclic equipment	NACE C – equipments industry
Replacement of Freon based refrigerating machine	NACE C – equipments industry

Integrated technologies: cleaner technologies	Producers
Restriction of emission and odour caused by fossil fuel combustion, e.g. facilities at and casing of combustion equipment	NACE C – equipments industry
Restriction of gaseous emissions and odours due to fuel combustion, for example coverings for premises and parts of equipment consuming oil based fuels	
Re-use of exhaust gases as a means of preventing and reducing emissions to the atmosphere.	NACE C – equipments industry
Reuse of waste gas to prevent air pollution	NACE C – equipments industry
Robot in process reducing air pollution within foundry	NACE C – equipments industry
Screen sheet metal wash, water based	NACE C – equipments industry
Silencer of extractor	NACE C – equipments industry
SO2 meter from bark furnace	NACE C – equipments industry
Special device for taking away bottom ashes	NACE C – equipments industry
Stain machines for water stain	NACE C – equipments industry
Supplementing the refrigerating plant from freon to ammonia as cooling means	NACE C – equipments industry
Transition to enamel with water based colours	
Trimming of airflows	
Vacuum conveyor, enclosure of process with handling chemicals	NACE C – equipments industry
Vacuum pumps instead of steam ejectors	NACE C – equipments industry
Ventilation, switchover from Freon to water	
Ventilator, isolator	NACE C – equipments industry
Water cutting robot	NACE C – equipments industry
Water lacquering with drier	NACE C – equipments industry
Water stain cylinder	NACE C – equipments industry
Wastewater	
Adoption of closed circuit cooling water systems to prevent and reduce thermal pollution	NACE C – equipments industry
Adoption of cooling air systems instead of cooling water systems	NACE C – equipments industry
Assemblage of magnate ventilator for shutting down water flows when machinery stops	
Cabin washer for reducing emissions to air and water	NACE C – equipments industry
Circulating cooling system	NACE C – equipments industry
Cleaning of process-cleaning water through vacuum evaporation equipment	NACE C – equipments industry
Climate controlled watering of lumber with recycling	NACE C – equipments industry
Compressed air dryer	NACE C – equipments industry
Deionisation of processing water to reduce the concentration of chemicals	
Enclosed cooling system	NACE C – equipments industry
Enclosed system of rinsing water for developing films	NACE C – equipments industry
Enclosed water cooling system	NACE C – equipments industry
Enclosed water system regarding processed water	NACE C – equipments industry
Enclosure of cooling system	NACE C – equipments industry
Equipment for taking care of slam in enclosed system	NACE C – equipments industry
Exchange of dishwasher	NACE C – equipments industry
Extra oxygen supply facility	NACE C – equipments industry
Installation of circulation tank for cold water when spot welding	NACE C – equipments industry
Installation of coal filters before outgoing water; main use is to recycle the water	NACE C – equipments industry
Installation of heating cables	NACE C – equipments industry
More efficient washing equipment for storage packing	NACE C – equipments industry
More modern printing press	NACE C – equipments industry
New moisturizing method that saves water usage and uses no chemicals	
Oil separator	NACE C – equipments industry
Polymeric facility	
Purifying processing water from alkaline washing	

Integrated technologies: cleaner technologies	Producers
Rebuilding and changed pipelines	NACE C – equipments industry
Rebuilding of the department of surface treatment; new process bathtub and purifying plant	
Reduced chromium discharge in wastewater	
Reduction of consumption of water or reuse of water	
Reductions in water use, reuse of water	
Regulation arrangement for water transferring	
Resistance rinsing equipment in Ni/Cr line	
Supplementing purifying plant to clean water so it can be recycled	
Supplementing surface treatment unit with additional economical rinsing steps; this is done to reduce discharge of fluoride	
Ultraviolet light for reduction of the growth of bacteria in rinsing water	NACE C – equipments industry
Vacuum pump in process manufacturing	NACE C – equipments industry
Ventilator shutters	NACE C – equipments industry
Washing machine with enclosed system and machinery details	NACE C – equipments industry
Washing robot, re-circulation of H2O and Ism	NACE C – equipments industry
Washing system improvement for dosage	NACE C – equipments industry
Waste	
Reduction in the use of raw and auxiliary materials to reduce amount of waste	
Reduction of use of raw materials to reduce the quantity of waste generated	
Reuse of waste in the production process	NACE C – equipments industry
Reuse of waste materials in the production process	NACE C – equipments industry
Soil and groundwater	
Burning exchanger for solvent	NACE C – equipments industry
Distant heating connection	NACE C – equipments industry
Double covering or double walls for tanks and reservoirs to prevent leaks and protect soil and groundwater.	
Exchange for low energy using fittings	NACE C – equipments industry
Exchange of electrical cables containing PCB oil	NACE C – equipments industry
Exchange of high tension in oil cables	
Exchange of MPS	
Repletion protection for container	
Repletion protection for oil	
Steering system for filters, ventilations	
Noise and vibration	NACE C – equipments industry
Equipment and machines designed or constructed for a low noise or vibration level	NACE C – equipments industry
Flexible appendages etc.	NACE C – equipments industry
Foundations designed to damp vibrations	NACE F
Furnaces or components with low noise emission levels	NACE C – equipments industry
Ground flares	NACE C – equipments industry
Low-noise burners on flares	NACE C – equipments industry
Noise reducing measurement	
Parts of equipment and machinery designed to reduce noise and vibrations	NACE C – equipments industry
Regrouping of buildings and/or installations to reduce noise pollution	NACE F
Special facilities in the construction or reconstruction of buildings (including insulation material in buildings)	NACE F
Biodiversity and landscape	
Pylons which blend in with the landscape	NACE F
Prevention of damage to nature and landscape (e.g. detouring site-access roads, drilling at an angle)	NACE F
Other	
Steps in reducing magnetic fields	

Table A5.3 : List of cleaner technologies

Sustainable agriculture and Organic farming

Organic farming is an integrated technology as it is less polluting (i.e. it falls in the environmental protection group) in the production stage. But for practical reasons, it has been agreed to estimate statistics measuring number of farmers for employment and organic farming goods for turnover, value added and exports and classify them as adapted goods.

Organic farming is seen as the most important environmental activity of the agriculture sector. Due to the fact that the natural resources taken into account by the definition used in this Handbook for the EGSS do not include the soil, this activity can fall into different environmental domains of CEPA. In fact a change towards less environmental harmful processes and methods can lead agriculture to reduce its environmental impact on soil, groundwater and surface water, biodiversity as well as to reduce the intake of water. In the following paragraphs the concept of sustainable and organic agriculture are discussed and some hints on compiling data on organic farming goods are presented.

What is sustainable agriculture?

Sustainable agriculture can be defined as "the environmentally friendly methods of farming that allow the production of crops or livestock without damage to the farm as an ecosystem, including effects on soil, water supplies, biodiversity, or other surrounding natural resources. The concept of sustainable agriculture is an 'intergenerational' one in which we pass on a conserved or improved natural resource base instead of one which has been depleted or polluted"[65].

Another definition is "farming that provides a secure living for farm families; maintains the natural environment and resources; supports the rural community; and offers respect and fair treatment to all involved, from farm workers to consumers to the animals raised for food"[66].

What is organic agriculture?

Organic agriculture (OA) is a part of the larger category of *sustainable agriculture*. There are a number of definitions of organic agriculture that vary slightly across national and regional regulations and private voluntary standards. At the international level, there are two main points of reference: the Codex Alimentarius Commission, a joint intergovernmental initiative of the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) dealing with food safety and labelling matters, and the International Federation of Organic Agriculture Movements (IFOAM), an international umbrella organization for the organic movement with some 700 members worldwide. Both have developed organic standards that are intended to serve as "standards for standards" (i.e. not intended to be standards themselves, but to assist countries and institutions in developing their own standards).

IFOAM defines OA as including: "…all agricultural systems that promote environmentally, socially and economically sound production of food and fibers. Recycling nutrients and strengthening natural processes helps to maintain soil fertility and ensure successful production. By respecting the natural capacity of plants, animals and the landscape, it aims to optimize quality in all aspects of agriculture and the environment. Organic agriculture dramatically reduces external inputs by refraining from the use of synthetic fertilizers and pesticides, genetically modified organisms and pharmaceuticals. Pests and diseases are controlled with naturally occurring means and substances according to both traditional as well as modern scientific knowledge, increasing both agricultural yields and disease

[65] National Safety Council (2005). Environmental glossary; available at: www.nsc.org/ehc/glossar2.htm.
[66] Global Resource Action Center for the Environment (GRACE) (2005). *Introduction to sustainability: sustainable dictionary*; available at: www.sustainabletable.org/intro/dictionary/#s.

resistance. Organic agriculture adheres to globally accepted principles, which are implemented within local socio-economic, climatic and cultural settings" [67].

The Codex Alimentarius Commission further specifies that: "organic agriculture is one among the broad spectrum of methodologies which are supportive of the environment. Organic production systems are based on specific and precise standards of production which aim at achieving optimal agro-ecosystems which are socially, ecologically and economically sustainable. 'Organic' is a labelling term that denotes products that have been produced in accordance with organic production standards and certified by a duly constituted certification body or authority".[68]

Within the category of OA, *uncertified OA* goods are produced according to organic methods but are not certified as organic by a third party. *Certified OA* products, on the other hand, are produced and processed in accordance with organic standards and this is checked and certified by a third party (i.e. a certification body). The certification body generally indicates this positive assessment by allowing its seal to be affixed to the good.

Agriculture is considered to be organic at EU level if it complies with Council Regulation (EEC) No 2092/91. This Regulation has been amended on several occasions, in particular in 1999 when the Council extended its scope to cover organic livestock production (No 1804/99). In June 2004, the European Commission adopted the "European Action Plan for Organic Food and Farming" whose objective is to facilitate the ongoing development of organic farming in the EU with 21 concrete policy measures to be implemented[69].

Where to find organic agriculture?

OA is part of NACE 1, Agriculture. OA goods are also processed and transformed and thus should be found in NACE class 15, manufacture of food and beverages.

Data on OA or OA goods can be obtained from experts (e.g. IFOAM), certification bodies and other institutions as well as carrying out Internet and literature search.

It has to be stressed that the scope of OA goods has been rapidly expanding into other categories than organic food and beverages. Consumers today can purchase organic pet food, cosmetics, cleaning products, textiles and even mattresses. For processed certified OA goods, each stage of production, processing, storage and transportation must be certified as organic in order for the final good to be certified.

[67] IFOAM (2004). *Organic Agriculture Worldwide: IFOAM Directory of the Member Organizations and Associates 2005.* Neunkirchen, Germany, IFOAM.
[68] FAO/WHO Codex Alimentarius Commission (2001). *Codex Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods*. GL 32 - 1999, Rev.1 - 2001. Rome, FAO,WHO.
[69] EUROSTAT, *Organic farming in Europe*, Statistics in focus, 31/2005, KS-NN-05-031-EN-N

Renewable energy

Renewable energy is an adapted good.

In the energy production sector, all equipments producing renewable energy are integrated, i.e. resource-efficient, technologies.

Definition of "renewable energy": the International Energy Agency (IEA)[70]

The International Energy Agency includes the following categories into its definition of renewables:

- Hydropower: Potential and kinetic energy of water converted into electricity in hydroelectric plants. It includes large as well as small hydro, regardless of the size of the plants.
- Geothermal Energy: Energy available as heat emitted from within the earth's crust, usually in the form of hot water or steam. It is exploited at suitable sites for electricity generation after transformation, or directly as heat for district heating, agriculture, etc.
- Solar Energy: Solar radiation exploited for hot water production and electricity generation. Does not account for: passive solar energy for direct heating, cooling and lighting of dwellings or other.
- Wind Energy: Kinetic energy of wind exploited for electricity generation in wind turbines.
- Tide/Wave/Ocean Energy: Mechanical energy derived from tidal movement, wave motion or ocean current, and exploited for electricity generation.
- Solid Biomass: Covers organic, non-fossil material of biological origin which may be used as fuel for heat production or electricity generation.
- Wood, Wood Waste, Other Solid Waste: Covers purpose-grown energy crops (poplar, willow etc.), a multitude of woody materials generated by an industrial process (wood/paper industry in particular) or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, black liquor etc.) as well as wastes such as straw, rice husks, nut shells, poultry litter, crushed grape dregs etc.
- Charcoal: Covers the solid residue of the destructive distillation and pyrolysis of wood and other vegetal material.
- Biogas: Gases composed principally of methane and carbon dioxide produced by anaerobic digestion of biomass and combusted to produce heat and/or power.
- Liquid Biofuels: Bio-based liquid fuel from biomass transformation, mainly used in transportation applications.
- Municipal Waste (renewables): Municipal waste energy comprises wastes produced by the residential, commercial and public services sectors and incinerated in specific installations to produce heat and/or power. The renewable energy portion is defined by the energy value of combusted biodegradable material.
- Combustible Renewables and Waste (CRW): Some of the waste (the non-biodegradable part of the waste) is not considered renewables as such. However, proper breakdown between renewables and non-renewables is not always available.

Precision on what is biomass in the context of the "Emission Trading Directive"

In the context of the "Emissions Trading" Directive[71], a list of materials, which are considered biomass, has been proposed. Peat and fossil fractions of the materials listed below shall not be considered biomass. The list contains:

[70] Source: OECD/IEA (2007), Renewables in global energy supply.

- Plants and parts of plants (straw; hay and grass; leaves, wood, roots, stumps, bark and crops such as maize and triticale);
- Biomass wastes, products and by-products (industrial waste wood such as waste wood from woodworking and wood processing operations and waste wood from operations in the wood materials industry;
- Used wood such as used products made from wood and wood materials and products and by-products from wood processing operations;
- Wood-based waste from the pulp and paper industries such as black liquor with only biomass carbon;
- Crude tall oil, tall oil and pitch oil from the production of pulp;
- Forestry residues; lignin from the processing of plants containing lingo-celluose;
- Animal, fish and food meal, fat, oil and tallow; primary residues from the food and beverage production;
- Plant oils and fats;
- Manure;
- Agricultural plant residues;
- Sewage sludge;
- Biogas produced by digestion, fermentation or gasification of biomass;
- Harbour sludge and other waterbody sludges and sediments;
- Landfill gas and charcoal;
- Biomass fractions of mixed materials (the biomass fraction of flotsam from waterbody management);
- The biomass fraction of mixed residues from food and beverage production; the biomass fraction of composites containing wood;
- The biomass fraction of textile wastes;
- The biomass fraction of paper, cardboard, pasteboard;
- The biomass fraction of municipal and industrial waste;
- The biomass fraction of black liquor containing fossil carbon;
- The biomass fraction of processed municipal and industrial wastes;
- The biomass fraction of ethyl-tertiary-butyl-ether (ETBE) and the biomass fraction of butanol);
- Fuels whose components and intermediate products have all been produced from biomass (bioethanol; biodiesel; etherised bioethanol; biomethanol; biodimethylether; bio-oil - a pyrolysis oil fuel and bio-gas).

[71] COMMISSION DECISION of 23/11/2006 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council.

Eco-labels, a way to identify adapted goods

The inclusion of adapted goods in the scope of the EGSS implies to identify them practically and to find sources of data for retrieving the turnover, value added, employment and exports linked to these goods.

Adapted goods have been defined as goods which are less pollutant at the time of their consumption and/or scrapping (cleaner products) and more resource efficient during production (that is products with a lesser content of natural resource inputs) or use than equivalent normal products which furnish similar utility.

Some goods are easily identified as adapted goods as, for instance, renewable energy, as it is produced avoiding the use of fossil energy resources, recycled and recovered goods, as they avoid the use of natural resources, biodegradable soap as they are less pollutant during consumption and scrapping than normal detergents or less energy consuming appliances as they are more resource efficient during use.

The category of adapted goods could contain any kind of good once it has been established that it comply with the definition of being less pollutant and/or more resource efficient than normal products which furnish similar activity. This means that in theory an adapted good can exist for every kind of consumable good. This is the case for example of household appliances and cars. A fridge consuming less energy than a normal equivalent fridge is an adapted good. A car consuming less fuel than an equivalent normal car is an adapted good.

How to establish which is the normal equivalent good in order to define an adapted good?

Eco-labels are a practical solution for identifying goods with a reduced impact on the environment. An eco-label is a labelling system for consumer products whose consumption and/or production avoids detrimental effects on the environment. Eco-labels can take into account a great variety of environmental aspects for the same product, as for instance energy efficiency, pollution and toxicity.

Only a small set of goods need to have mandatory eco-labels. For most of the goods on the market eco-labelling is voluntary, meaning that they are not mandatory by law.

In general, two main types of eco-labels can be distinguished:

- comparison labels: key information on environmental performance (as for example energy consumption, CO2 emissions) is shown for comparative purposes. Additional measures of environmental efficiency (for example a star, a letter, one colour or any other kind of efficiency rating) may also be shown. This type of system works best when it is mandatory for all products (so that poor performers can be identified and readily avoided by consumers). Examples of this type of label can be found on appliances and cars in Australia, Europe, USA and Canada, as well as a number of Asian countries (eg Philippines, Hong Kong, Thailand and Korea).

- endorsement labels: help consumers distinguish between a range of similar products by providing a “seal of approval” for products which meet or exceed some established criteria. Supplier participation in these programmes tends to be voluntary and endorsement labels tend not to disclose much information on environmental performance (although this is often available through lists of endorsed products). It is a system which operates on the principle - “we know what is good, trust us” and works best if only a limited proportion of the market carries an endorsement. Primary examples of endorsement labels are the US EPA Energy Star program (see Figure 9) for office equipment (but this is becoming so universal that it has

lost the advantage of endorsing only the better products), Swiss Energy 2000 (E2000) programme (office equipment and appliances) now used in several European countries, Power Smart in Canada, Green Seal in the US (environmental), Blue Angel in Germany (environmental). Minimum performance criteria may be based on a range of criteria, including for example energy consumption and energy efficiency. They tend to be set such that only the top 10% to 40% of performers can achieve endorsement to produce maximum market impact.

Energy label

One of the main environmental concern which is addressed by the use of eco-labels is energy efficiency.

In the European Union, according to several different EU Directives[72] most white goods, light bulb packaging and cars must have an EU Energy Label clearly displayed when offered for sale or rent. The energy efficiency of the appliance is rated in terms of a set of energy efficiency classes from A to G on the label, A being the most energy efficient, G the less efficient. The labels can give other useful information to the customer. In an attempt to keep up with advances in energy efficiency, A+ and A++ grades were later introduced for refrigeration products by the producers themselves.

The EU Energy label is mandatory for the following products:

- Refrigerators, freezers and combined appliances
- Washing machines, tumble dryers and combined appliances
- Dishwashers
- Ovens
- Water heaters and hot water storage appliances
- Air conditioners
- Light bulbs
- Cars (for motor-vehicle it is carbon dioxide emissions in grams per kilometre travelled that it is indicated rather than kWh per hour).

Other products could in principle use an energy label even if it is not mandatory. For instance, the European Vending Association announced that, it has adopted an energy consumption scheme for vending machines. Manufacturers will be able to label the energy consumption class of their equipment in a user-friendly and transparent way.

All the products in the most efficient category (e.g. A or A++) should be considered as adapted goods.

Other environmental aspects

Certain eco-label schemes aim at helping consumers to choose environmental friendly products, taking into account different environmental aspects as energy consumption, material consumption, waste disposal, toxicity, etc.

An example of such labels is the European eco-flower label.

This is a voluntary scheme designed to encourage businesses to market products that are kinder to the environment and for European consumers - including public and private purchasers - to easily identify them.

[72] For example 92/75/CEE, 94/2/CE, 95/12/CE, 96/89/CE, 2003/66/CE.

The EU Eco-label is administered by the European Eco-labelling Board (EUEB) and receives the support of the European Commission, all Member States of the European Union and the European Economic Area (EEA). The Eco-labelling Board includes representatives such as industry, environment protection groups and consumer organisations.

There are currently twenty-three different product groups, and already more than 250 licences have been awarded for several hundred products.

These products can be considered as more environmental friendly than equivalent normal products (i.e. products without an eco-label) and thus can be considered as adapted goods.

Other eco-labelling scheme administered by private companies exists, as for instance the Nordic Swan label.

The Nordic Swan voluntary eco-label was introduced by the Nordic Council of Ministers in 1989 to encourage production methods that limit environmental impacts. Nowadays it is one of the most well-known European eco-label and it has become increasingly used outside of northern Europe. The cross-stakeholder nature of the criteria development with close cooperation and technical input from industry has ensured a high level of "buy in" from consumers, policy-makers, business and NGOs.

Recommendations for including eco-labelled goods among adapted goods

Eco-labels can provide the mean for identifying adapted goods. In the case of comparison labels, adapted goods should regarded as the goods in the top class (the best environmental performer). In the case of endorsement labels, all the products should be regarded as adapted goods. Attention should be paid to the case of labels which have been awarded to the majority of the goods on a market (e.g. the case of the Energy star label): in this case the eco-label is no more helpful for the identification of adapted goods.

It is not possible to offer an exhaustive list of eco-labelled products. Efforts should be placed first of all on products for which eco-labels are mandatory all over the European Union. This is the case for example of the goods which have to show the EU energy label. The goods which pertain to the top energy efficiency class should be picked up as adapted goods and classified in the CReMA 13b group, Heat/Energy saving. Also cars display the same energy label through Europe. All cars in the top class should be classified as adapted products in the CEPA 1 and CReMA 13b group.

All other goods which have been awarded an eco-label can be considered as adapted goods. Difficulties can arise in the classification of these goods since the eco-label take into consideration several environmental concerns. The detailed specifications of each eco-label can give information on the main environmental concern that is addressed by the labelling scheme.

Annex 6. The WTO list of Environmental goods

WTO document *Synthesis of submissions on environmental goods*[73] (thereafter "the WTO Draft List" or "the WTO list") contains all the products listed by Canada, the European Communities, Japan, Korea, New Zealand, Qatar, Switzerland, Chinese Taipei and the United States in their submissions for the negotiations of tariffs reduction on a set of "environmental goods" [74].

In total, the WTO Draft List contains 480 entries. Each item contains a short description of the good and its code HS. There is one entry per HS heading or sub-heading (2, 4, 6-digits heading are used). However, there are 37 entries without HS code (entries 444-480). Thus, the list is considerably longer than the list in the OECD/Eurostat Manual (1999) and the APEC list[75], as well as the combined OECD and APEC list. In fact all the entries in these two lists are included in the WTO draft list.

Members have used categories as a tool to catalogue the products whose purpose or function may not have been evident from the HS code and to help illustrate the environmental purposes justifying the products' inclusion in the lists[76]. These categories refer directly or indirectly to the categorisation used by OECD/Eurostat Manual (1999).

A first analysis by categories used by WTO Members reveals that 54 per cent of the entries fall in the area of pollution management, 21 per cent in the area of Resource Management and 25 per cent of the entries refer to cleaner products and technologies (CP/T), environmental preferable products (EPP) and high environmental performance or low environmental impacts (HEP). This category is proposed by the European Union to include the following eight sub-categories: vegetable plaiting materials; pulps of fibrous cellulosic material; vegetable textile fibres; other natural products; sustainable agriculture or gardening (organic fertilisers, natural pest control); energy efficiency (low consumption bulbs); sustainable transport (public transport of persons/transport of goods, other forms of sustainable transport); and eco-labelled products. Following the guidelines contained in this Handbook most of the goods labelled as EPP and HEP in the WTO list could be considered as adapted products.

A list of environmental goods?

Most of the goods in the WTO list are not "environmental" goods following the definition fixed by this handbook.

The list contains some end-of-pipe and integrated technologies, some connected goods and some adapted goods. Nonetheless the rest of the list includes goods that are used as intermediate consumption of end-of-pipe technologies (e.g. chemicals used by wastewater treatment plants) and which cannot be defined as connected goods because they are not produced exclusively for Environmental Protection or Resource Management purposes. Some goods are not environmental goods because they fall outside the scope of the definition of the Handbook: they refer to e.g. natural risk management or to e.g. resources that are not included in the domain of natural resources by the Handbook. Some goods are simply not environmental goods, e.g. trains and all the materials related to building railways.

Table A1 contains the entries of the WTO list which can be said to be environmental goods following the definition and categorisations used by this Handbook.

[73] WTO, Synthesis of submissions on environmental goods, Informal Note by the Secretariat, TN/TE/W/63, 17 November 2005.
[74] The WTO draft list 2005 contains for each good also the CPC, ISIC and NACE ver.1.1 codes, in order to make possible to establish a connection between goods and the sectors producing these goods .
[75] The APEC list has been developed by the Asia-Pacific Economic cooperation starting from the list in Environmental industry OECD/Eurostat Manual (1999).
[76] Canada, TN/TE/W/50/Suppl.1, para. 3.

Entry WTO list	Description	Comments	EGSS env. domain
1, 2	Pyrethrum	Pyrethrum is a natural (not synthetic) pesticide. Nonetheless it is still dangerous (toxic) for wildlife (cannot be in CEPA 6). Its production is less resource intensive, it save fossil resources. It could be said to be an adapted good in CReMA 13c	CReMA 13c
5,6, 50	Vegetable and animal waxes	The production of vegetable waxes is less resource intensive and save fossil resources. They could be adapted goods in CReMA 13c	CReMA 13c
7	Diatomite	Diatomite used as a natural pesticide can be considered an adapted good in CEPA 6 since it is of no toxicity for wildlife. For all other uses it is not a connected product since it is produced for other uses than EP or RM	CEPA 6
17, 18	LNG and LPG	LNG and GTL LPG, when used as fuels for motor vehicles can be considered as adapted goods since they reduce air emissions of e.g. cars.	CEPA 1
38	Hydrogen peroxide	Used for many purposes e.g. cleaning, microbial pesticides, paper bleaching. H_2O_2 is a cleaner alternative (adapted good) to other chemicals as it breaks down to water and oxygen in the environment.	CEPA 2
39-41	Methanol	Methanol is a low pollution fuel, producing emissions low in reactive hydrocarbons and toxic compounds. It is also a component in biodiesel manufacture, a biofuel which should be considered a renewable energy (adapted good) following the IEA definition.	CEPA 1, CReMA 13a
44-45	Animal or vegetable fertilisers	Organic fertilisers are adapted goods since they represents an alternative to synthetic, chemical-based fertilisers.	CEPA 4
46	Colouring matter of vegetable or animal origin	Colouring matter of vegetable or animal origin are adapted goods in CEPA 3 since they reduce waste or in CReMA 13c since they reduce the extraction of fossil resources for the production of synthetic colouring matter	CEPA 3, CReMA 13c
47	Natural soaps made from vegetable oil	Natural soaps made from vegetable oil are Biodegradable. They are adapted goods in CEPA 2	CEPA 2
48, 57	Oil spill dispersant chemicals	Chemicals (mixtures of surfactants and solvents) that convert oil on sea/water surface into small droplets that disperse in the water column to low concentration, reducing the impact on wildlife and speeding up natural decomposition processes. Oil spill dispersant chemicals are connected goods for CEPA 4	CEPA 4
49	Biodegradable surface-active preparations for emulsifying hydrocarbons in water or soil	Biodegradable surface-active preparations for emulsifying hydrocarbons in water or soil are connected goods for CEPA 4	CEPA 4
53	Biological pest control agents	Biological pest control is an env. specific service in CEPA 4 and CEPA 6 (it depends if it substitute insecticides and pesticides which are polluting the soil or are harmful for the wildlife). Biological pest agents are connected goods	CEPA 4, CEPA 6
57	Biodiesel	Biodiesel is an adapted good in the renewable energy CReMA 13a group	CReMA 13a
57	Nitrification inhibitors	Nitrification inhibitors prevent nitrogen leaching from soil, fertiliser and/or urine from livestock, by restricting microbial conversion of ammonium to nitrate and hence to the gases nitrogen and nitrous oxide (nitrous oxide is a greenhouse gas). These are connected goods for CEPA 4 and CEPA 1	CEPA 4, CEPA 1
58	Natural polymers	Natural polymers can be adapted goods in CEPA 3 (since they reduce waste disposal problems) or in CReMA 13c since they reduce extraction of fossil resources	CEPA 3, CReMA 13c
67, 72	Soundproof panels and screens for outdoor uses	Soundproof panels and screens are connected goods for CEPA 5	CEPA 5
68-71, 73	Plastic geomembranes	Plastic geomembranes for soil protection, watertightness, anti-erosion of soil are connected goods (or end-of pipe technologies) for CEPA 4	CEPA 4
75,76, 145, 146	Waterless urinals, dry closets	Waterless urinals and composting toilets are adapted goods in CReMA 10 and or CEPA 2	CReMA 10, CEPA 2
77	Solar collector	Solar collector and solar system controller are integrated technologies for the production of renewable energy (CReMA 13a) or for the production of heat (CReMA 13b)	CReMA 13a, CReMA 13b
78	Floating beam	Floating beam used to contain oil spills are connected goods in CEPA 4	CEPA 4
81	Natural rubber	Natural rubber is an adapted good in CReMA 13c	CReMA 13c
60-63, 79, 80, 159-163, 189-191, 195	Waste and scraps	Waste and scraps are related to waste management activities. The activities producing these goods are thus included in CEPA 3 as env. specific services	CEPA 3
97, 98, 193, 439	Waste containers	Waste containers are connected goods for CEPA 3	CEPA 3
102	Vegetable fibres	Vegetable textile fibres would be adapted products if the resources they are made of is taken into account by the RM of handbook. They could be adapted good for CEPA 3 since they are biodegradable.	CEPA 3
113-115	Felt	Mattresses made of synthetic materials, for soundproofing are connected goods for CEPA 5	CEPA 5
121-122	Fishing nets	made up fishing nets that incorporate turtle excluder devices are adapted goods.	CEPA 6
132, 133, 154, 155	Minerals and other materials for insulation	Slag wool, rock wool and similar mineral wools; exfoliated vermiculite, expanded clays, foamed slag and similar expanded mineral materials; mixtures and articles of heat-insulating, sound-insulating or sound-absorbing mineral materials. These Insulation goods are connected goods either for CEPA 5 or CReMA 13b only if they can be clearly identified as used only for EP or RM purposes	CEPA 5, CReMA 13b

Entry WTO list	Description	Comments	EGSS env. domain
134	Septic tanks	Septic tanks are connected goods for CEPA 2	CEPA 2
150	Multiple walled insulating units of glass	Multiple walled insulating units of glass are connected goods / adapted goods for CEPA 5 and CReMA 13b	CEPA 5, CReMA 13b
166, 168-169, 302-304	Energy from waste	Energy from waste is recorded as adapted good for CReMA 13a when it comply with definition of renewable energy (which means that waste must contain biomass)	CReMA 13a, CEPA 3
183	Solar stoves	Solar stoves are adapted goods in CReMA 13b	CReMA 13b
206, 208, 249	Distilling or rectifying plant	Equipment used for biogas production is integrated technology for the production of renewable energy	CReMA 13a
216	Industrial mufflers and engine silencers	Industrial mufflers and engine silencers are end of pipe technologies	CEPA 5
218-221	Hydraulic turbines	Hydraulic turbines and water wheels are integrated technologies for the production of renewable energy	CReMA 13a
227	Wind pumping systems	Wind powered pumping system are integrated technologies since they save energy	CReMA 13b
240, 250, 309, 311	Heat pumps	Heat pumps are integrated technologies for the production of heat in a more efficient way	CReMA 13b
244, 245, 322-325	Waste incinerators	Waste incinerators are end-of-pipe technologies for waste management and integrated technology for the production of renewable energy	CReMA 13b, CEPA 3
247	Solar water heaters	Solar water heaters are integrated technologies for reducing the extraction of fossil fuels by producing heat from renewable energy	CReMA 13b
249	Solvent recycling plant	Solvent recycling plant are integrated technologies for CEPA 3	CEPA 3
249	Seawater desalinisation systems	Seawater desalinisation systems are integrated technologies for CReMA 10	CReMA 10
286	Asphalt recycling equipment	Asphalt recycling equipment are integrated technologies in CReMA 13c	CReMA 13c
295	Taps	Taps that reduce the use of water are adapted goods in CReMA 10	CReMA 10
310- 314	Electric motors	Electric motors as equipment for renewable energy production are integrated technologies in CReMA 13a	CReMA 13a
341-342	Fluorescent lamps	Fluorescent lamps as all other less consuming lamps are adapted goods in CReMA 13b	CReMA 13b
344	Solar cells	Solar cells are connected goods for the production of renewable energy, CReMA 13a	CReMA 13a
360-362	Electric vehicles	Electric and hybrid vehicles are adapted goods in CEPA 1	CEPA 1
363	Composting systems	Composting systems are end of pipe technologies for CEPA 3	CEPA 3
364	Refuse disposal vehicles	Refuse disposal vehicles are end of pipe technologies in CEPA 3	CEPA 3
367	Silencers and exhaust pipes	Silencers and exhaust pipes are end of pipe technologies for CEPA 5	CEPA 5
382-383	Barges	Inflatable oil spill recovery barges are end of pipe technologies	CEPA 4
384-385	Mirrors	Mirrors for solar energy production are connected goods in CReMA 13a	CReMA 13a

Table A6.4 : Environmental goods in the WTO list

Analysis of CP/T, HEP, EPP groups: adapted goods?

According to this Handbook, environmental goods can be classified into two groups: environmental protection and Resource Management. Both classes can be further divided in different domains and include cleaner/resource efficient technologies and products (i.e. adapted goods and integrated technologies). Adapted goods are defined in a wide and encompassing way as goods that are less pollutant and or more resource efficient than their equivalent products furnishing the same function. Thus, this definition encompasses not only the goods that in the WTO draft list are labelled as CP/T, but also a great number of the goods in the EPP and HEP groups.

The WTO draft list contains 138 entries from the CP/T, HEP, EPP groups. Following the guidelines of this Handbook, 50 of these entries were not considered, mainly referring to sustainable transport (bicycles, trains and boats for example). The remaining 88 entries are re-categorized in the two main categories suggested by this handbook, i.e. environmental protection and Resource Management.

Natural pesticides, insecticides and fertilizers are defined as adapted goods belonging to CEPA 4 (protection and remediation of soil). According to the SEEA, natural pesticides and insecticides could also be categorized as Protection of biodiversity and landscape, CEPA 6, depending on the fact that the fertiliser reduce the pollution in the soil or is less harmful for wildlife.

All the products considered biodegradable or natural in the WTO list are considered from a waste disposal point of view and thus are to categorised in CEPA 2 and 3 groups. Some vegetable products are considered as reducing the use of fossil resources and thus categorised in the CReMA 13c.

Cleaner fuels come to be in the CEPA 1 group since they contribute to the reduction of air pollution. Bio-diesel is part of CReMA 13a since it is a renewable energy according to IEA definition. Electric generator and other equipment indispensable for renewable energy production are integrated technology in CEPA 13a.

Recycled paper is an adapted good in CReMA 11b.

Waterless urinals and composting toilets are adapted goods in CReMA 10 since they minimise water use.

All electric appliances are in the CReMA 13b group: these goods are in fact supposed to be less pollutant and or more resource efficient than their equivalent products furnishing the same function. Thus they represent an example of adapted good.

Conclusions

The WTO Draft list contains a higher number of entries than any other list of environmental goods. The USA remarked that the Secretariat's compilation of submissions had become too large and unmanageable[77]. At the same time several delegations questioned the direct environmental benefit of some of the proposed products. As it has been shown a certain number of goods are very difficult to be classified as environmental goods. Many other are environmental goods only to a certain extent.

Even when only goods that can be fully considered as environmental goods by the definition contained in this Handbook are taken into account, the WTO list remains long. A reason for this is that without a certain definition to rely upon members have included a larger number of goods. Another reason is the insertion of a certain number of products labelled as EPP or HEP of great interest to developing countries in order to reach a positive conclusion of negotiation.

The size of the list should not be regarded as a problem as long as it remains a list of environmental goods. Nevertheless the WTO draft list contains all the goods from the OECD/Eurostat Manual (1999) and a considerable number of goods from the groups CT/P, HEP, EPP. The reason is to be found in the willingness to find an agreement with developing countries to conclude positively negotiations on tariffs liberalisation of environmental goods. Most of the goods in these categories are undoubtedly environmental goods (mainly adapted goods). However, the list is not exhaustive. According to a report by the OECD, half of the environmental goods likely to be in use within the coming decade do not currently exist[78]. It has been suggested that an agreed list of environmental goods should be considered a "living list"[79] and that a process should be set up to update and expand the list[80]. This would help in reflecting the reality of the evolution of environmental sector and technological change and encourage technological innovation in a field where evolution in technologies is the key to

[77] WTO, Continued work under paragraph 31(III) of the Doha declaration, Submission by the United States, Paragraph 31(iii), TN/TE/W/64, 20 February 2006

[78] OECD (1998) *The Global Environmental Goods and Services Industry*, OECD Publications, Paris.

[79] Submissions by New Zealand: "Environmental Goods", 10 February 2005, TN/TE/W/46, paras. 13-18; "Environmental Goods", 26 May 2005, TN/TE/W/49, para. 6; and "Environmental Goods", Statement at the CTESS Informal Meeting of 10 June 2005, Supplement, 16 June 2005, TN/TE/W/49/Suppl.1, para. 23.

[80] New Zealand, TN/TE/W/46, para. 16; European Communities, TN/TE/W/47, para. 7 and "EC Submission on environmental goods", 5 July 2005, TN/TE/W/56, para. 1; Switzerland, TN/TE/W/57, paras. 16-17. With respect to precedents in this regard, the 1996 Ministerial Declaration on Trade in Information Technology Products and the Uruguay Round "zero-for-zero" initiative on the Trade in Pharmaceutical Products, were developed on the assumption that the lists of products covered by these agreements would need to stay abreast of, and be responsive to, technological breakthroughs.

successfully addressing environmental challenges[81]. For statistical purposes, this means that the population of the environmental sector should be carefully updated from time to time.

Add to this caveat the fact that there is no agreement on the definition of environmental goods and that the list is a negotiated list and thus suffering from a "trade policy" constraint, the fact that the list is not exhaustive is not surprising. In any case, the list is found useful as a tool providing examples to complete the compilation of the population of environmental sector. As the OECD/Eurostat Manual (1999) list, the WTO list could be used as a starting point to identify environmental corporations as well as to complete the population and check it.

With respect to the usefulness as a tool to find statistics on trade in environmental goods, the picture is gloom. When taking into account only the goods that should be considered as environmental by this Handbook, at least two constraints make it not very useful for statistical purposes.

First of all, the list is based on the 6-digits HS nomenclature. This classification is not sufficiently detailed to obtain a list of only environmental goods. In fact most of the entries of the list are accompanied by an ex out in order to better specify which goods are to be considered to be environmental in a certain HS sub-heading. This makes reliable estimation of trade in environmental goods using directly HS codes and foreign trade statistics very difficult.

The conclusion is therefore that the list is fully exploitable only as a tool to build up the population of environmental sector. There are a few number of 100% environmental HS 6-digits entries (for example, wind generators, HS 850231). When these entries do not come from corporations devoted entirely to the environment, they could be used to obtain reliable statistics on these goods.

Thus, statistics for the goods contained in the list and based on the HS codes could be seen as a limit (maximum) value of trade in environmental goods. In order to obtain more precise statistics (at least on the goods that are on the list) a detailed survey for each HS code would be required in order to evaluate which is the "environmental" share of each HS code.

Recommendations on the use of the WTO Draft list

The previous paragraphs have highlighted the importance of being aware of the limits of a list that has been built through negotiations and for negotiations purposes. Interests in negotiating tariff reductions in environmental goods go far beyond environmental goods. This is reflected in the composition of the list. Nevertheless the list can be still useful. It could be used as a tool to identify and to complete the population of environmental sector. To this purpose the list offers a bigger number of goods that the Environmental industry OECD/Eurostat Manual list. However attention has to be paid to goods that are not "environmental" according to the definition given in the Handbook.

For estimating data on the environmental sector, too few environmental goods are identifiable by a code (HS, etc.) in order to be able to find statistics on those products. Estimation of the environmental shares for all the other products should be conducted on a product basis and would be very time consuming, requiring the advice of experts. For the few goods whose HS code is 100% environmental[82], it is relatively easy to find statistics.

[81] "Initial List of Environmental Goods", submission by the United States, 1 July 2005, TN/TE/W/52, para. 4; European Communities, TN/TE/W/47, para. 7; and "EC Submission on environmental goods", 5 July 2005, TN/TE/W/56, para. 1.
[82] This is the case for the goods used in the analysis by Ecotec (2002).

Annex 7. The German list of environmental goods and services

Since 1996 Germany has a survey addressed to the producers of environmental goods and services. The survey is addressed to the main producers of environmental goods and services. The environmental protection refers to goods, construction operations and services serving the purpose of emission reduction. Emission reduction is the avoidance, reduction or removal of damaging influences on the environment caused by production and consumption. They refer to the environmental areas of "waste management" (CEPA 3), "water protection" (CEPA 2 but also the part of CEPA 4 which refers to groundwater and surface water), "noise abatement" (CEPA 5), "air quality control" (CEPA 1.1.1 and 1.2.1), "nature and landscape conservation" (CEPA 6), "soil decontamination" (the part of CEPA 4 which refers to soil) and "climate protection" (CEPA 1.1.2 and 1.2.2 but include also CReMA 13a and b).

This list has been established by Statistics Office, in consultation of, for example, industrial associations or universities. The products are sub-divided in 3 categories: environmental goods, environmental services and construction works, thus in accordance with the Environmental Industry OECD/Eurostat. Each product has a code with 5 numbers. The first number indicates the categories (goods, services and construction works). They are then distinguished according to the principal material composing the products, and this constitutes the second number. For example, in the case of goods, 0 is for textile, 1 is for wood, etc. The third number is the environmental domain. The environmental domain is attributed to a product according to the Environmental industry OECD/Eurostat manual but also using the SERIEE approach. The last two numbers are linked to the kind of activity (planning, measuring, process control, etc.).

In the tables below a PRODCOM code is added to most of the goods for easy identification. Note however that in most of the cases the PRODCOM codes includes goods that are not environmental. A column NOTE has been added to the tables to explain which goods are "environmental" following the definition of this Handbook.

Table A7.5 : German list of goods for environmental protection

Code PRODCOM	Description	NOTE: Is it an environmental good? If yes, what kind of environmental good?
Waste management: Waste management covers the avoidance, utilisation and removal of waste as defined in the Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal (KrW-/AbfG). This class is comparable to CEPA3		
	Filter textiles for waste treatment	Connected good
2051 14 590	Wooden compost silos	Connected good
	Chemicals, basic chemicals, preparations for the waste management industry	Not an environmental good
2522 15 850; 2523 13 030 2522 15 860; 2524 23 290	Plastic waste containers	Connected good
2121 12 500; 2522 1 2522 11 030; 2522 12 030 2522 12 050	Waste bags	Connected good
	Plastic equipment for landfills, e.g. landfill liners and covers	Connected good
1450 23 800 2666 12 009	Glass, ceramic, mineral and cement, products for waste management, e.g. dried clay for landfills	Not an environmental good: it is impossible to distinguish dried clay for landfills from dried clay for other uses.
2821 11 503; 2871 11 008 2875 12 498	Metal waste containers	Connected goods
	Metal waste sieves and gratings	Connected goods
	Waste transfer units	Connected goods
2956 22 350	Waste drying units	Connected goods
2922 16 50; 2922 17 950 2922 18 770	Waste conveyance equipment	Connected goods
2956 25 979 3320 65 590	Machinery and equipment for sizing, separating, sifting and sorting waste	End-of-pipe technology
2956 25 979	Waste de-assembly and shredding equipment	End-of-pipe technology
2942 34 300; 2956 25 979	Equipment for agglomerating, pelletising, pressing and	End-of-pipe technology

Code PRODCOM	Description	NOTE: Is it an environmental good? If yes, what kind of environmental good?
	mixing waste	
	Machinery and equipment for biological waste treatment plants	End-of-pipe technology
2862 30 650; 2971 21 500 2971 21 800; 2956 25 979 2956 26 509; 3720 14 301 3720 20 104; 3720 21 126 3720 24 703; 3720 25 138	Plants for mechanical/biological domestic waste treatment	End-of-pipe technology
2924 21 303 2924 40 779	Thermal waste treatment plants	End-of-pipe technology
2921 12 500; 2921 13 550 2924 21 30; 2924 21 303 2924 21 309; 2924 40 730 2956 25 979	Chemical waste treatment plants	End-of-pipe technology
	Treatment plants for landfill leach water	End-of-pipe technology
2924 23 370; 2924 23 370 3210 62 690	Measuring and analysis instruments for waste	Not an environmental good
2924 22 530; 2924 22 550	Process control instruments for waste treatment, e.g. dosing equipment for waste treatment plants	Not an environmental good
3410 4; 3410 54 901	Disposal vehicles	Connected good
2956 25 979; 3420 10 507 3420 21 007; 3420 21 009	Vehicles and vehicle parts	Not an environmental good
2956 25 976; 2956 25 979	Sweepers and sweeper-vacuum machines	Connected good
2952 40 370; 2956 25 979 2956 23 85	Vehicles for landfills	Connected good
Water protection: Measures serving water protection are those designed to reduce the waste water quantity or waste water load (reduction or removal of solids and dissolved solids and for the reduction of the quantity of heat) and to protect the surface waters and groundwater. Goods for closed-circuit water systems should be included.		
1710 20 500; 1740 25 900 1754 38 509	Filter textiles for waste water treatment	Connected good
	Paper filters for waste water treatment	Connected good
2430 22 799; 2466 48 990	Chemicals, basic chemicals, preparations for water protection	Not an environmental good
2521 21 705; 2523 15 580 2524 28 500	Plastic waste water pipes and sewer construction elements	Not an environmental good: waste water pipes are not different from other pipes
2524 28 400	Plastic filters, sieves and refuse baskets for waste water treatment	Connected good
2924 52 550	Plastic products for biological waste water treatment plants, e.g. fixed beds	Connected good
2523 13 030	Plastic containers and basins for water-endangering substances	Connected good
2640 13 000; 2661 12 009 2661 13 000	Stoneware or cement waste water pipes and collectors	Connected good
1412 20 300; 2924 12 351 2924 12 355	Glass, ceramic, mineral and cement products for mechanical waste water treatment plants, e.g. filter inserts	Not an environmental good
1422 12 100; 2615 26 900	Glass, ceramic, mineral and cement products for securing water-endangering substances, e.g. containers for water-endangering substances, oil adsorption agents	Not an environmental good
2875 27 130	Metal waste water pipes, fittings, valves, and sewer construction elements	Not an environmental good: waste water pipes are not different from other pipes
2722 10; 2821 11 309 2875 27 410; 2924 12 7	Metal filters, sieves and refuse baskets for waste water treatment	Connected good
2923 11 3	Metal waste water heat exchangers	Heat exchangers are an integrated technology for heat/energy saving (CReMA 13b)
2872 12 890	Metal containers and basins for water-endangering substances	Connected good
2912 24 130; 2912 24 150 2912 24 300; 2912 31 300	Pumps and siphons for waste water	Connected good
2912 24 300; 2922 18 770 2924 12; 2924 12 3 2924 12 351; 2924 12 355" 2924 12 355; 2924 24 708 2924 31 5; 2924 52 550 2956 25 979	Mechanical waste water treatment plants	End-of-pipe technology
2924 12 331; 2924 12 335" 2924 52 550	Biological waste water treatment plants	End-of-pipe technology
2924 12 3; 2924 12 331 2924 12 335; 2924 12 335 2924 12 355; 2924 31 530 2956 25 975	Chemical/physical waste water treatment plants	End-of-pipe technology
2956 22 505	Thermal waste water treatment plants	End-of-pipe technology

Code PRODCOM	Description	NOTE: Is it an environmental good? If yes, what kind of environmental good?
2924 52 550	Machine accessories for waste water treatment plants	Connected good
2924 12 3; 2924 31 570 2956 25 975	Machinery and equipment for sludge treatment	Connected goods
2612 13 900; 2956 25 975 3320 52 830; 3320 53 5 3320 53 503; 3320 53 810 3320 53 830; 3320 53 890 3320 65 590; 3320 65 730 3320 65 890; 3340 23 590	Measuring and analysis instruments for waste water	Not an environmental good
	Process control instruments for waste water treatment, e.g. dosing equipment for waste water treatment plants	Not an environmental good
3410 54 901; 3420 23 09	Vehicles for transport of waste water and sewage sludge	Connected good
Noise abatement: Measures serving noise abatement are those reducing or avoiding noise and preventing noise from spreading. Measures for the protection from vibrations should be included. Only those goods should be indicated that have not been produced for reasons of safety at work.		
1740 25 900; 2052 15 550 1754 20 009	Soundproofing textiles	Connected good
2030 13 030; 2051 14 590	Wooden noise barriers	Connected good
	Wooden sound locks	Connected good
2030 11 501	Wooden or cork soundproofing	Connected good
2052 13 700; 2052 14 000	Cork oscillation dampers or insulation	Connected good
2523 15 909; 2524 22 300	Plastic products for soundproofing, e.g. noise barriers, soundproofing materials	Connected good
2513 73 470; 2513 73 609	Plastic oscillation dampers	Connected good
2614 12 930; 2661 12 002 2682 12 900; 2682 13 00 2682 16 300	Glass, ceramic, mineral and cement products for noise abatement, e.g. Liapor noise barriers	Connected good
2811 23 400; 2811 23 709 2956 25 979; 3430 30 900	Metal products for soundproofing, e.g. sound locks	Connected good
2924 54 000; 2956 25 979 3430 20 630	Metal oscillation dampers	Connected good
3320 53 830	Sonometers	Not an environmental good: it can be for other uses than noise reduction
3430 20 630; 3430 12 008	Mufflers for vehicles	Connected good
Air quality control: Measures for air quality control are those removing, reducing or avoiding non-atmospheric substances (smoke, soot, dust, gases, aerosols, steams or odorous substances) in emissions. Only those goods should be indicated that have not been produced for reasons of safety at work.		
1754 31 509; 1754 38 509	Filter textiles for waste gas treatment	Connected good
2430 22 530; 2466 46 600	Paper filters for waste gas purification units	Connected good
	Chemicals, basic chemicals, preparations, for air quality control	Not an environmental good
2524 28 709	Plastic waste gas hoses and hoods	Not an environmental good
1412 10 530; 2614 12 930 2682 16 300; 2682 16 700	Glass, ceramic, mineral and cement products for ventilation engineering and gas drain pipes	Not an environmental good
2722 10; 2722 20 500	Metal products for ventilation engineering and gas drain pipes	Not an environmental good
2923 11 3	Metal waste gas heat exchangers	Connected good
2875 27 8; 2923 14 702	Metal products for waste gas purification, e.g. thermal separators	Connected good
2923 14; 2923 14 1 2923 14 130; 2923 14 409 2923 14 70; 2923 20 2923 20 300; 2924 52 5 2956 25 979	Machinery and equipment for ventilation engineering and waste gas discharge	Not an environmental good:
2923 11 500; 2924 52 530	Machinery and equipment for waste gas and emission cooling, e.g. heat exchangers, cooling towers	Heat exchangers are integrated technology for heat/energy savings (CReMA 13b)
2921 12 900; 2921 14 2923 11 330; 2923 14 150 2923 14 701; 3162 13 905 3622 14 700	Aerosol and gas separation units	End-of-pipe equipments
2923 14 150; 2923 14 200	Equipment for separating solid and liquid materials from waste air and waste gas	End-of-pipe equipments
3320 51 390; 3320 52 830 3320 53 1; 3320 53 130 3320 53 190; 3320 65 790	Measuring and analysis instruments for waste gases	End-of-pipe equipments
"3320 70 300 3320 70 900"	Process control instruments for waste gas treatment, e.g. dosing equipment for waste gas purification	Connected good
2923 14 403; 2923 20 2924 13 500; 2924 52 530; 3430 20 999	Emission purification units for vehicles, e.g. catalytic converters (excl. soot filters for diesel engines)	Connected good
2923 14 403	Soot filters for diesel engines	Connected good
1421 12 305; 1430 1	Glass, ceramic, mineral and cement products for nature	Not an environmental good:

Code PRODCOM	Description	NOTE: Is it an environmental good? If yes, what kind of environmental good?
1450 23 800	and landscape conservation, e.g. amphibian protection systems	
	Measuring and analysis instruments for nature and landscape conservation, e.g. equipment for flora/fauna analysis	Not an environmental good:
Soil decontamination: Measures serving soil decontamination are those for the removal or reduction of substances that are dangerous to the environment (according to Art. 3a of the law on chemical products) and of preparations in the soil or for the protection from the spreading of such substances and preparations in the soil and ground water.		
2941 11 950; 2952 24 000 2952 30 500	Machinery and equipment for soil decontamination	Connected good
	Measuring and analysis instruments for soil decontamination	Not an environmental good
Climate protection: Measures serving climate protection are those avoiding or reducing the emission of greenhouse gases (according to Kyoto Protocol: Carbon dioxide, methane, dinitrogen oxide, partially halogenated chlorofluorocarbons, perfluorinated hydrocarbons, sulphur hexafluoride). Climate protection includes measures for the utilisation of renewable energies and measures for saving energy or improving energy efficiency.		
2020 13 380; 2030 13 030 2052 13 700; 2052 14 000 2052 15 300; 2052 15 550	Wood or cork products for heat insulation	Connected good for heat/energy savings (CReMA 13b)
2430 22 60; 2430 22 605	Chemicals, basic chemicals, preparations for equipment serving climate protection	Not an environmental good
2924 40 779; 4021 10 1	Production of biomass fuels and biomass motor fuels	Adapted goods
2521 41 200; 2521 41 300 2521 41 500	Plastic products for heat insulation	Connected good for heat/energy savings (CReMA 13b)
2612 12 700; 2612 13 300 2615 12 000; 2630 10 710 2662 10 507; 2665 11 00 2665 11 003; 2665 11 005 2665 11 007; 2665 11 009 2666 12 002; 2682 16 100 2682 16 800; 2682 16 900	Glass, ceramic, mineral and cement products for heat insulation	Connected good for heat/energy savings (CReMA 13b)
2912 12 370; 2912 41 300 3110 32 501; 3110 61 005 4011 10 730	Wind power plants	Integrated technology for Renewable energy production (CReMA 13a)
2911 21; 2911 21 500 2911 22 000; 2911 31 000 2911 32 000; 2912 12 3 2912 12 370; 2912 41 300 4011 10 720	Hydroelectric power plants	Integrated technology for Renewable energy production (CReMA 13a)
2972 14 009	Solar thermal plants	Integrated technology for Renewable energy production (CReMA 13a)
3110 10; 3110 10 300 3110 10 950; 3162 13 905 3210 52 370; 4011 10 750	Photovoltaic plants	Integrated technology for Renewable energy production (CReMA 13a)
4030 10 050	Geothermal plants	Integrated technology for Renewable energy production (CReMA 13a)
2924 40 730; 4030 10 030 4021 10 130; 4011 10 200 4011 10 300	Biogas plants or biomass heating (power) stations	Integrated technology for Renewable energy production (CReMA 13a)
4030 10 090; 4021 10 150 4021 10 150"	Landfill gas and sewage gas plants for power and heat supply	Integrated technology for Renewable energy production (CReMA 13a)
2972 12; 2972 12 700	Small combustion plants for wood, crop or straw	Integrated technology for Renewable energy production (CReMA 13a)
3110 31; 3110 31 300 3110 32 3	District heating power stations	Integrated technology for Heat/energy saving (CReMA 13b)
2030 11 100; 2523 14 550 2812 10 3; 2812 10 5	Products for low-energy/passive houses, n.e.c.	Not an environmental good
3320 52 890; 3320 65 730 3340 21 530	Measuring and analysis instruments for plants using renewable energies, general	Not an environmental good
	Measuring and analysis instruments for district heating power stations	Not an environmental good
3320 52 830; 3320 63 708	Measuring and analysis instruments for low-energy/passive houses	Not an environmental good
3320 51 350	Measuring and analysis instruments for saving energy and improving energy efficiency, n.e.c.	Not an environmental good
	Process control instruments for plants using renewable energies, general	Not an environmental good
	Process control instruments for district heating power stations	Not an environmental good
3320 52 830	Process control instruments for low-energy/passive houses	Not an environmental good
3320 70 1	Process control instruments for saving energy and	Not an environmental good

Code PRODCOM	Description	NOTE: Is it an environmental good? If yes, what kind of environmental good?
	improving energy efficiency, n.e.c., e.g. thermostats	

Table A7.6 : German list of construction works for environmental protection

Description	NOTE: Is it an environmental good? If yes, what kind of environmental good?
Waste management	
Construction of interim storage facilities and collection points for waste	End-of-pipe technologies
Construction of waste loading facilities	End-of-pipe technologies
Construction of waste treatment facilities	End-of-pipe technologies
Construction of composting facilities	End-of-pipe technologies
Construction of plants for mechanical/biological domestic waste treatment	End-of-pipe technologies
Construction of thermal waste treatment plants	End-of-pipe technologies
Construction of landfills for domestic and industrial waste	End-of-pipe technologies
Construction of special waste landfills	End-of-pipe technologies
Construction of demolition waste landfills	End-of-pipe technologies
Construction of container landfills	End-of-pipe technologies
Construction of underground landfills	End-of-pipe technologies
Construction of landfill shafts	End-of-pipe technologies
Construction of catchments for landfill leach water	End-of-pipe technologies
Construction of catchments for landfill gas	End-of-pipe technologies
Landscape shaping and plantations for landfills	End-of-pipe technologies
Water protection: Measures serving water protection are those designed to reduce the waste water quantity or waste water load (reduction or removal of solids and dissolved solids and for the reduction of the quantity of heat) and to protect the surface waters and groundwater. Construction operations for closed-circuit water systems should be included.	
Sewer construction / construction work for sewerage redevelopment / construction of drains	End-of-pipe technologies
Construction of rain retention tanks	
Construction of sewage pumping stations	
Construction of culverts	
Construction of waste water treatment plants	End-of-pipe technologies
Construction of light liquid separators	
Construction of plants for waste water purification, decontamination and neutralisation	
Construction of cooling towers	
Construction of digestion towers	
Construction of sludge settling facilities	End-of-pipe technologies
Construction of sludge polders	
Environmental protection facilities for the construction of storage depots for hazardous substances	
Environmental protection facilities for the construction of pipelines for water-endangering liquids and gases	
Construction of measuring stations for waste water	
Construction of closed-circuit water systems	Integrated technologies
Noise abatement: Measures serving noise abatement are those reducing or avoiding noise and preventing noise from spreading. Measures for the protection from vibrations should be included. Only those construction operations should be indicated that were not performed for reasons of safety at work.	
Construction of noise protection embankments	End-of-pipe technologies
Construction of vibration protection groundwork	End-of-pipe technologies
Air quality control: Measures for air quality control are those removing, reducing or avoiding non-atmospheric substances (smoke, soot, dust, gases, aerosols, steams or odorous substances) in emissions. Only those construction operations should be indicated that were not performed for reasons of safety at work.	
Construction of desulphurisation plants	End-of-pipe technologies
Construction of denitrification plants	End-of-pipe technologies
Construction of dust removal plants	End-of-pipe technologies
Nature and landscape conservation: Measures for nature or landscape conservation are those for the preservation, restoration or reshaping of the natural appearance of the soil and vegetation and for the protection of the fauna; this includes in particular measures for recultivation and for the prevention of land becoming boggy or deserted.	
Earthworks for recultivation measures for landfills and opencast mines	
Bog renaturation	
Waste land renaturation	
Civil engineering works for protection against soil erosion	End-of-pipe technologies
Construction of wind barriers	End-of-pipe technologies
Surface earthworks for landscape shaping in nature and landscape conservation	
Recultivation of waters	
Construction of animal protection systems (e.g. for amphibians)	

Description	NOTE: Is it an environmental good? If yes, what kind of environmental good?
Soil decontamination: Measures serving soil decontamina¬tion are those for the removal or reduction of substances that are dangerous to the environment (according to Art. 3a of the law on chemical products) and of preparations in the soil or for the protection from the spreading of such substances and preparations in the soil and ground water.	
Test and exploratory drilling for soil decontamination	End-of-pipe technologies
Construction operations for soil mechanics, earthworks and foundation engineering, as far as soil decontamination is concerned	
Construction of underground protective walls	End-of-pipe technologies
Construction of biological soil purification plants	End-of-pipe technologies
Construction of thermal soil purification plants	End-of-pipe technologies
Construction of plants for treating contaminated soil	End-of-pipe technologies
Climate protection: Measures serving climate protection are those avoiding or reducing the emission of greenhouse gases (accoording to Kyoto Protocol: Carbon dioxide, methane, dinitrogen oxide, partially halogenated chlorofluoro¬carbons, perfluorinated hydrocarbons, sulphur hexafluoride). Climate protec¬tion includes measures for the utilisation of renewable energies and measures for saving energy or improving energy efficiency.	
Construction/assembly of wind power plants	Integrated technologies
Construction/assembly of hydroelectric power plants	Integrated technologies
Construction/assembly of solar thermal plants	Integrated technologies
Construction/assembly of photovoltaic plants	Integrated technologies
Construction/assembly of geothermal plants	Integrated technologies
Construction/assembly of biogas plants or biomass heating (power) stations	Integrated technologies
Construction/assembly of landfill gas and sewage gas plants for power and heat supply	Integrated technologies
Construction/assembly of small combustion plants for wood, crop or straw	Integrated technologies
Construction/assembly of district heating power stations	Integrated technologies
Construction/assembly of low energy /passive houses	Adapted goods
Construction work for saving energy and increasing energy efficiency (except 20710)	Integrated technologies
Measures avoiding and reducing the emission of Kyoto greenhouse gases, e.g. conversion of cooling and refrigeration plants for the use of halogen-free coolants	Integrated technologies

Table A7.7 : German list of services for environmental protection

Description	NOTE: Is it an environmental good? If yes, what kind of environmental good?
Waste management: Waste management covers the avoidance, utilisation and removal of waste as defined in the Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal (KrW-/AbfG).	
Inspections and analyses for waste management, e.g. waste analyses	Environmental specific services
Expert opinions for waste management, e.g. setting up waste registers, environmental impact analyses, environmental protection audits	
Concepts, consulting and software for waste management, e.g. setting up waste management concepts and environmental information systems	
Planning for waste management, e.g. planning of plants such as interim storage facilities, collection points, transfer units, waste treatment facilities, composting facilities, thermal waste treatment plants, landfills and relevant landscape shaping and plantation	
Project management and control for waste management, e.g. for the construction of plants (for examples of plants cf. 30104)	
Water protection: Measures serving water protection are those designed to reduce the waste water quantity or waste water load (reduction or removal of solids and dissolved solids and for the reduction of the quantity of heat) and to protect the surface waters and groundwater. Services for closed-circuit water systems should be included.	
Inspections and analyses for water protection, e.g. sewer inspections (incl. cleaning), waste water analyses	Environmental specific services
Expert opinions for water protection, e.g. expert opinions for waste water disposal, inspection of transportation containers for hazardous substances, environmental impact analyses, environmental protection audits	
Concepts, consulting and software for water protection, e.g. consulting in waste water disposal, environmental information systems	
Planning for water protection, e.g. planning of plants and installations such as sewers and sewer networks, rain retention tanks, plants for waste water purification, decontamination and neutralisation, cooling and digestion towers, sludge settling facilities, storage facilities for water-endangering substances, pipelines for water-endangering liquids and gases, measuring stations for waste water	
Project management and control for water protection, e.g. for the construction of plants and installations (for examples of plants and installations cf. 30204)	
Noise abatement: Measures serving noise abatement are those reducing or avoiding noise and preventing noise from spreading. Measures for the protection from vibrations should be included. Only those services should be indicated that were not provided for reasons of safety at work.	
Inspections and analyses for noise abatement, e.g. noise pressure and vibration measurement, frequency analysis	Environmental specific services
Expert opinions for noise abatement, e.g. expert opinions on noise and vibration,	

Description	NOTE: Is it an environmental good? If yes, what kind of environmental good?
environmental impact analyses, environmental protection audits	
Concepts, consulting and software for noise abatement, e.g. for noise abatement systems, environmental information systems	
Planning for noise abatement, e.g. for noise abatement systems	
Project management and control for noise abatement, e.g. for noise abatement systems	
Air quality control: Measures for air quality control are those removing, reducing or avoiding non-atmospheric substances (smoke, soot, dust, gases, aerosols, steams or odorous substances) in emissions. Only those services should be indicated that were not provided for reasons of safety at work.	
Inspections and analyses for air quality control, e.g. emissions measurement (excl. exhaust gas tests for motor vehicles and excl. measurements for households)	
Expert opinions for air quality control, e.g. expert opinions for emission discharge, environmental impact analyses, environmental protection audits	
Concepts, consulting and software for air quality control, e.g. consulting for emission discharge, environmental information systems	
Planning for air quality control, e.g. for desulphurisation, denitrification and flue gas dust removal plants	
Project management and control for air quality control, e.g. for the construction of plants (for examples of plants cf. 30404)	
Nature and landscape conservation: Measures for nature or landscape conservation are those for the preservation, restoration or reshaping of the natural appearance of the soil and vegetation and for the protection of the fauna; this includes in particular measures for recultivation and for the prevention of land becoming boggy or deserted.	
Inspections and analyses for nature and landscape conservation	
Expert opinions for nature and landscape conservation, e.g.environmental impact analyses, environmental protection audits	
Concepts, consulting and software for nature and landscape conservation, e.g. consulting for construction and landscape shaping, environmental information systems	
Planning for nature and landscape conservation, e.g. setting up plans for land development, green spaces, landscape framework, conservation and development, landscape planning	
Project management and control for nature and landscape conservation, e.g. recultivation measures	
Soil decontamination: Measures serving soil decontamination are those for the removal or reduction of substances that are dangerous to the environment (according to Art. 3a of the law on chemical products) and of preparations in the soil or for the protection from the spreading of such substances and preparations in the soil and ground water.	
Inspections and analyses for soil decontamination, e.g. examination of contaminated sites	
Expert opinions for soil decontamination, e.g. soil expert opinions	
Concepts, consulting and software for soil decontamination, e.g. environmental information systems	
Planning for soil decontamination, e.g. planning for treatment of contaminated sites/ soil mechanics, earth works and foundation engineering	
Project management and control for soil decontamination	
Climate protection: Measures serving climate protection are those avoiding or reducing the emission of green¬house gases (accoording to Kyoto Protocol: Carbon dioxide, methane, dinitrogen oxide, partially halogenated chlorofluorocarbons, perfluorinated hydrocarbons, sulphur hexafluoride). Climate protection includes measures for the utilisation of renewable energies and measures for saving energy or improving energy efficiency.	
Inspections and analyses for climate protection, e.g. analyses of buildings (thermography, air tightness tests, etc.), setting up energy balances and energy passes	
Expert opinions for climate protection, e.g. environmental impact analyses, environmental protection audits	
Concepts, consulting and software for climate protection, e.g. developing energy saving concepts	
Planning for climate protection, e.g. planning of plants for the use of renewable energy sources	
Project management and control for climate protection	
Across environmental areas	
Inspections and analyses	
Expert opinions, e.g. environmental impact analyses, environmental protection audits	
Concepts, consulting and software, e.g. environmental information systems	
Planning	
Project management and control	

Annex 8. Examples of the classification of "sustainable activities"

The OECD/Eurostat Manual refers to a certain number of "sustainable" activities. Sustainable activities should be regarded as economic activities not having environmental purpose but using several environmental products (self-produced or purchased) in order to reduce the pollution or the resource consumption induced by the production process.

Environmental domains classification of EGSS		**Sustainable activities**					
		Sustainable agriculture	*Sustainable urban planning*	*Sustainable energy*	*Sustainable transport*	*Eco-tourism*	*Sustainable construction*
Environmental protection activities	1 protection of ambient air and climate			X	X	X	
	2 wastewater management					X	
	3 waste management	X				**X**	X
	4 protection and remediation of soil and groundwater	**X**				X	
	5 noise and vibration abatement				X		
	6 protection of biodiversity and landscapes	X	X			X	
	9 Other						
Resource Management activities	10 management of water	X					X
	11 management of forest resources						
	…						
	13 management of energy sources		**X**	**X**	**X**	X	**X**
	…						
NOTES : Sustainable activities concern two or more environmental domains (x). The activity should be classified in just one domain depending on the main purpose (**X**). Sustainable transport refers to the production of vehicles less pollutants, less noisy or less energy consuming (adapted goods).							

Table A8.1 : Sustainable activities and main environmental domain

Table A8.1 illustrates which are the main environmental domains (CEPA and CReMA classes) for the most common "sustainable" activities.

For example sustainable agriculture refers to an economic activity (NACE 01 Agriculture) which has a positive effect on the environment mainly in terms of a reduced pressure on the soil and groundwater (CEPA 4) but which can have also a positive impact on the reduction of water use (CReMA 10). The handbook recommends to include in the scope of the EGSS a part of the sustainable agriculture through the inclusion of organic farmers.

Sustainable forestry concerns a the production of wood from certified sustainable forests. This wood is meant to replace a produced natural asset (wood from plantations or in general from cultivated forest without a certification of sustainability) which is not a natural resource in the scope of the EGSS. Thus sustainable forestry activities are not included in the scope of the EGSS.

Sustainable energy refers to the production of clean energy. This can be approximated by the production of renewable energy, which is included in the Management of energy sources.

Sustainable transport refers to economic activities in the transport sector which make use of vehicles with reduced impact on the environment. The EGSS does not take into account these transport services since their environmental purpose is not environmental. Nevertheless the production of vehicles they use could be included in the sector if these products fall in the definition of adapted goods

Eco-tourism stands for the attention some (certified) accommodation and food service activities put on the reduction of their impact on the environment. This is the case for example of the separate collection of waste in hotels, which should be recorded as an ancillary activity in the CEPA 3 class. Another example is the reduction of energy consumption of hotels, which should be reported as an ancillary activity in the CReMA 13b.

Sustainable construction refers to the construction of more efficient buildings (in terms of energy and heat consumption, but also in terms of the reduced environmental impact of components used) …

Sustainable urban planning refers to urban planning activities which take into account sustainable development issues. In this case the part of the activity which can be recorded in the EGSS is the part which is covered by the definition of the EGSS. This can be the case of urban planning activities which mainly address the protection of landscapes and biodiversity (CEPA 6) issue or activities which mainly address the reduction of energy consumption (CReMA 13B).

CHAPTER 4

A Framework for Data Collection

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3. A framework for EGSS data collection

This chapter outlines data sources, methods and best practices for the compilation and updating of data on EGSS. First, it presents the existing approaches to gather statistics on EGSS. Then, it provides guidance on how to estimate variables (i.e. turnover, value added, employment, exports) using existing statistics or surveys. The chapter includes recommendations on how to optimise the use of existing data and integrate and streamline data collection, recommendations on how to handle specific difficult examples, some strategies for implementing these recommendations and examples of assumptions and ratios to be applied. Some recommendations for crosschecking and quality control of data are summarised at the end of the chapter.

3.1. Existing approaches to gather EGSS statistics

The supply-side approach

Once the population has been established, the common approach to the collection of data is the supply-side approach. The collection of data is based on the supply of technologies, goods and services for environmental protection and Resource Management (see figure 4.1). This approach is suitable for principal and secondary activities.

The demand-side approach and ancillary activities

Ancillary activities are a particular case as, by definition, own production for own use means that supply and demand are the same. Thus for ancillary activities identifying the producers and collect data on their activities is the same as collecting data on the buyers of the technologies, goods or services (demand-side approach)[83].

Different methods according to the type of producer, the type of activity and availability of different sources

To compile statistics different sources of information are available according to the supply or demand side approach. These can be existing statistics or questionnaires sent to a specific sample of enterprises. These sources of information are presented in the sub-chapter 4.2.

According to the type of producer, i.e. corporation or General Government, the method for compiling data can be different. The reason is that data are issued from different sources depending on the type of activities (i.e. market and non-market). For each variable to collect, the methods are presented specifically for the corporations and for the General Government.

Furthermore, the method differs if the activity is principal or secondary or if the producer carries out both environmental and non-environmental activities. If the environmental activity is only a share of the total producer's activity (because it is a secondary activity or because the other activities are non-environmental), estimations should be done to get the most appropriate data. Methods are detailed in the sub-chapters related to each variable.

[83] Demand-side approach can also be used to obtain data on principal and secondary activities. Annex 9 contains some information on demand side and the combination of supply and demand approaches.

3.2. Sources for data compilation

Which data to compile ?

The Standard Tables presented in Chapter 5 of this Handbook aim at compiling data on four variables of the EGSS. These variables are turnover, value added, employment and exports.

Turnover and employment data are widely used indicators for analyzing economic sectors as well as monitoring their performance and growth. Value added is mainly used to compare the income created by the EGSS to the national income. Export data are important for the evaluation of the competitiveness of an economic sector within the global economy.

Sources of data compilation: existing statistics and surveys

The supply side approach is characterised by the collection of information on the supply of environmental technologies, goods and services by using existing statistics and/or collecting information by means of questionnaires. In any case, the starting point is the identification of the population as described in chapter 3.

If the data collection is based on already existing statistics the correspondence key (i.e. unique identification number by establishment, organisation number or similar) is of the highest importance.

If the data collection is based on surveys two approaches can be followed. The first approach is to add questions to existing surveys. The second is to set up a targeted survey.

These two methods for data compilation are presented hereafter. Surveys are however often considered as a last resort since National Statistical Offices face the need to drastically reduce the response burden in the interest of respondents.

3.2.1. Estimating variables using existing statistics

Information on the environmental sector can be obtained through existing administrative registers and statistical data. Table 4.1 shows the main sources of data for each variable. Following paragraphs present these data sources before plunging in the description of the procedures to estimate turnover, value added, employment and exports using as a basis these data sources. The use of each source can be limited to some producers and not to the entire population of the EGSS.

Variables / Sources	Turnover Value Added	Employment	Exports
Structural Business Statistics	✓	✓	
Industrial Commodity Statistics	✓	✓ (estimation from the value of production sold)	
Labour Statistics		✓	
Trade statistics			✓
VAT registers	✓		✓
National Accounts (Balance of Payments)			✓ (services)
National Accounts (others)	✓	✓ (estimation from input output tables)	✓ (supply and use tables, only products and activities entirely environmental)
SERIEE Accounts (Joint Questionnaire)	✓ (services)	✓ (services, only specialised producers)	✓ (services)

Table 3.1 : Main sources of statistics for the EGSS variables

Structural Business Statistics

Structural Business Statistics

Structural business statistics (SBS) describe the economy through the observation of units engaged in an economic activity. The main variables collected in the framework of the structural business statistics are:

- Demographic variables: number of enterprises, number of local units;
- "Input related" variables: number of persons employed, number of employees, personnel costs, gross investment in tangible goods;
- "Output related" variables: turnover, production value, value added at factor cost.

These variables are collected for all market activities at enterprise level. If the EGSS population database is constructed at the same level of entities, a straightforward connection of the variables of interest is possible through the corresponding unique identification number used in all existing registers.

If the EGSS database is constructed according to establishment level a certain amount of adjustments are needed such as calculating the share of the establishment related to the EGSS compared to the entire enterprise.

Industrial commodity statistics (PRODCOM) within the European Communities

Industrial Commodity Statistics

The purpose of the industrial commodity statistics is to describe the industrial production or sales divided by commodities. PRODCOM covers European Union production statistics for mining and quarrying, manufacturing, and electricity, gas and water supply, though some areas are not currently available.

PRODCOM statistics can help in calculating the share of environmental production to be applied to other sources of data, e.g. the SBS statistics.

Labour Statistics

Labour Statistics

Labour Statistics provide key indicators of labour market outcomes, as for example data on employment by age, gender or educational attainment, and data on average earnings of full-time workers and earnings distribution for each activity. The population of the EGSS can be linked to the labour statistics through the unique identification number of each establishment.

Trade statistics

Trade Statistics

The analysis of trade statistics can provide data on imports and exports by country of origin and destination. Trade statistics are arranged following a product classification and concern only transportable goods. Services are not covered.

Trade registers are the main source to find export data for the EGSS. Data are collected by products using the 6-digits HS classification at international level, and the 8-digits CN classification at national level.

If the trade statistics are available at establishment level the same approach as for the SBS statistics can be used. The correspondence unique identification number of each establishment in the EGSS population and in the trade statistics enables a transfer of data. It is important to be aware that if the establishment in question is produces also non environmental goods, services and technologies, the amount extracted from the trade statistics can contain some non-EGSS products. A decision has to be made whether to include the entire trade of the establishment as making part of EGSS or to try and exclude products not linked to the environmental sector by the means of the calculation of shares. Even if trade statistics are collected by product (and thus it is possible to know which products are exported by an establishment), it can be the case that some product categories are not detailed enough to distinguish environmental from non-environmental goods.

VAT registers

VAT registers

Value added tax (VAT) registers can be of valuable help in retrieving data on trade of EGSS related to services. VAT is paid on all goods and services and the registers capture the exports. By assuming that the difference between the exports in the trade statistics and the VAT registers (at enterprise/establishment level) is represented by the services, these figures can be considered to be the total export value of the EGSS.

National Accounts: Balance of Payments

Balance of payments

A source of data particularly important for exports of EGSS is the Balance of Payment (BOP). In particular the BOP is a source for data on export of services. Unfortunately the level of detail of BOP statistics does not allow for a deep analysis of the sector. It is possible to have data for a certain number of services, namely the sewage and refuse disposal, sanitation and similar activities at a very aggregate NACE level. Many other environmental services are scattered over other NACE classes of services and are often difficult to separate from non-environmental services.

The SERIEE accounts

The SERIEE accounts

The EGSS is partially covered by SERIEE accounts through the Environmental Protection Expenditure Account (EPEA[84]) and the Resource Use and Management Account (RUMEA) once it will be developed (see Figure 3.1).

The EPEA describes in details, among other things, the supply of EP services by specialised, secondary and ancillary producers but also the purchase of environmental adapted goods and connected products as final and intermediate consumption or gross fixed capital formation.

The EPEA can be helpful for retrieving data on ancillary production of EGSS as well as on environmental specific services.

The EPEA has the aim to assess the actual expenditure for environmental protection (EP) made by the total economy. This expenditure is presented by the sectors of the economy (by NACE) and by environmental domains. Such information is meant to provide indicators of the response of society to reduce pollution and for explaining changes in pressures and in the state of the environment.

The EPEA thus provides a framework for the consistent integration of all available basic data on environmental expenditure and activities. It links the uses of environmental protection services with their supply, following the model of the national accounts supply-use tables. For each main category of EP services, the supply and the use have to be equal. This identity is a powerful aid for consolidating data sources and compiling the accounts[85].

Among the tables in the EPEA framework, the following could be interesting for finding data on EGSS:

- Table B, the supply (production) of EP services, and the way they are produced. For specialised producers, table B provides also figures on employment.

- Table A, the EP expenditure, i.e. the expenditure for all the kind of uses of EP services and of connected and adapted products: final and intermediate consumption, gross capital formation (investment). Table A accounts for also some other transactions related with environmental protection (capital transactions and certain transfers).

[84] Eurostat, (1994) "SERIEE 1994 Version", Luxembourg.
[85] Furthermore, the EPEA describes also the uses of adapted goods and connected products, by user.

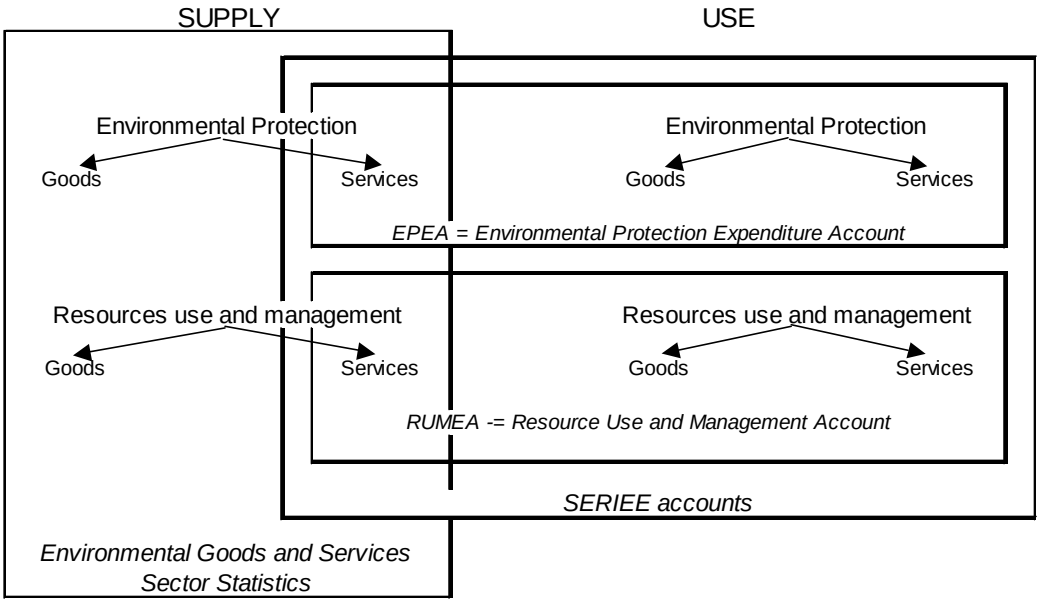

Figure 3.1 : Relationship between EGSS and SERIEE Accounts (Source: Istat, 2007, Internal note of the Task Force on EGSS).

- Table B1, a table integrating supply and uses of EP services, including imports and exports.

The Joint OECD/Eurostat Questionnaire

The Joint OECD/Eurostat Questionnaire on Environmental Protection Expenditure and Revenues (JQ) is the main tool for the international collection of data on environmental protection expenditure. As it concentrates on expenditures, it is first of all a source of data from the demand-side. However, ancillary activities of EGSS can be estimated from current expenditures data.

Other sources of information

NOTE: Each country publishes statistics on diverse topics. Some national databases could therefore help to establish statistics on the EGSS. For example, national energy balances, waste statistics or water accounts could provide useful information on the production of renewable energy and on the waste and water management sectors.

It could be the case that some countries have already developed data collection systems and schemes for some environmental activities, e.g. organic farming. When data are not directly available, estimations can be done to obtain some rough data. For example, in the case of organic farming, estimations from the surface areas, the number of organic farmers and their income, could provide data on the production of organic products.

3.2.2. Estimating variables using surveys

Surveys as a source of data

Even if the method of survey presents some weaknesses such as the cost of implementation, it is the best method as far as data coverage and quality are concerned. The principal strength of the survey approach is precision, since information can be very detailed.

Two routes can be followed when compiling variables using surveys: adding questions to existing surveys or create a new survey. These two approaches and the survey method in general, their advantages and disadvantages, as well as examples of surveys are presented in Annex 10.

Adding questions to existing surveys

Existing surveys can be complemented with supplementary questions to collect data concerning, for example, environmental specific services, integrated technologies and adapted goods.

Hungary uses this option. An example of its survey is presented in Annex 10.

Targeted surveys

In designing and implementing a survey of the environmental sector, two issues should be addressed: sample design and the elaboration of a questionnaire.

Germany has developed a specific questionnaire related to goods and services for environmental protection. This survey compiles types of environmental goods manufactured in the surveyed enterprises, sales revenues from these goods, revenues from sales for exports and employment. More information on the German survey is included in Annex 10.

3.3. Turnover of EGSS

3.3.1. Definition

Turnover is a useful concept to measure the size of a sector in a particular country.

Definition of turnover

> **Turnover** is "the totals invoiced by the observation unit[86] during the reference period, and this corresponds to the market sales of goods or services supplied to third parties"[87]. Therefore, it does not include stocks changes neither imported goods nor services.

Included are all charges (transport, etc.), duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit vis-à-vis its customers and other similar deductible taxes directly linked to turnover.

Excluded are reductions in prices, rebates and discounts as well as the value of returned packaging, income classified as other operating income, financial income

[86] Observation unit are LKAU or parts of the governmental units, as explained in Chapter 2.
[87] Definitions of SBS Regulation variables.

and extra-ordinary income in company accounts as well as operating subsidies received from public authorities or the institutions of the European Union.

Turnover is therefore the production sold within a period by an establishment. It is not really the production since the stocks represent the difference between the values of the production and the value of the turnover. Turnover represents a very good proxy for the amount of production when environmental sector is dominated by services providers. In this case, the difference due to stocks changes and traded goods is not significant.

Turnover of non-market producers

For a non-market producer, such as the government, the turnover is not calculated by the value of the sales of production, as there are no sales. Turnover is therefore estimated by the total costs of production.

3.3.2. Intermediate consumption and turnover as a basis for the estimation of other variables

The double counting problem and the exclusion of the intermediate consumption

The delimitations of the EGSS scope to include only main producers reduce the risk of double counting and an overestimation of the EGSS' turnover issued from the suppliers and distributors' activities.

However, among main producers, it is still possible to have double counting as some environmental technologies, goods or services could be used in the production of another environmental output. Considering both activities could lead to an overestimation of the size of the environmental sector.

Furthermore, as the other variables concerning the EGSS, such as the employment, are potentially derived from the turnover, this overestimation could influence their value on the rise.

Therefore, in order to avoid double counting, the intermediate consumption of environmental technologies, goods and services should be quantified and excluded from the total turnover of the EGSS producers when turnover is used as a basis to calculate the employment (see sub-chapter 4.5).

The case of secondary and ancillary activities: intermediate consumption associated to the principal activity

However, as secondary or ancillary activities are generally of minor importance, one can assume that the whole intermediate consumption of environmental technologies, goods and services is related to the principal non-environmental activity. This means to assume that, for secondary or ancillary activities, no intermediate consumption of environmental products or technologies are realised. This leads to the fact that no specific inquiry is needed to estimate what part of the unit's intermediate consumption of environmental technologies, goods and services has been used for the environmental (secondary or ancillary) activity.

3.3.3. The turnover of the corporations

The turnover of corporations' principal and secondary activities

As presented in Chapter 3, some corporations are easily identifiable according to specific environmentally related NACE classes. As statistical registers provide generally data by NACE category, turnover for these corporations can quite readily be extracted from the registers. And as it is assumed that these

corporations carry out only environmental activities, the entire turnover of the NACE category can be taken into account. This would avoid looking and estimating turnover by establishment.

In the case of the sectors that provide both non-environmental and environmental technologies and products (for example, secondary activities, production of renewable and non renewable energy or the manufacturing enterprises producing both filters for purifying air and other filters, etc), it is necessary to know which is the environmental share of the activities and how to allocate the appropriate turnover to the production of environmental technologies and products.

Estimation of turnover

Methods based on estimated coefficients can be used to estimate turnover on the environmental sector from existing statistical data.

- If the population is large, it is possible to estimate the share of total suppliers producing environmental goods and services by establishing a correspondence between producers of environmental goods and services (in a particular NACE class or in the corporations sector) and total producers.

  For example, the results of a survey shows that a given percentage of industrial equipment suppliers produce goods and services with an environmental purpose. This share can then be globally applied to estimate the turnover of environmental goods and services in this NACE class or the entire sector. The "establishment-by-establishment" analysis is therefore not necessary in this case.

- When the population is not very large, shares can be estimated by doing it on establishment-by-establishment basis.

When turnover is only available at enterprises level, distribution of turnover between the establishments should be done to isolate "environmental" turnover if the company has several activities, some not related to the environmental sector. Data can be distributed from enterprise level to establishment level by constructing weights of, for example, the number of employed people at the establishment on the total number of employed people in the company. This weight is thus applied to the total turnover.

NOTE: For some sectors, such as the energy production, most employees are located in the headquarters whereas the production takes place elsewhere. In these cases, instead of employees, the number of establishments could be used and equal parts of turnover could be distributed to each of the establishments.

For example, Sweden and Belgium have applied the method of share of turnover in the case of producers undertaking activities less of 50% environmental and use the total turnover for the principal producers. Details on the Swedish and Belgian cases can be found in Annex 13.

Another method: the use of physical data or consumption data

When economic data are not available, information on turnover can be estimated by combining physical output data (e.g. tons of waste, litres of wastewater, meters of noise panels, number of hybrid cars, etc.) with average price ratios. This approach can be applied for environmental technologies and products but the results will generally be very approximate.

A particular case is the production of energy. In order to distinguish between turnovers generated by the production of renewable energy, data on physical production of energy can be used to calculate the ratio of renewable to total production of energy.

The turnover of corporations' ancillary activities

For ancillary activities, production and consumption are the same, since by definition own production means own expenditure for the use of the goods or services. As these are non-market activities, the turnover represents the costs of the production. It is therefore equal to the environmental expenditures incurred.

These costs of production regroup personnel costs, material costs (excluding environmental technologies, goods and services), investments for the own account production (consumption of fixed capital) and taxes on the production related to the environmental activity.

For the particular case of the production of EP ancillary services, data on costs of production can be provided by data on ancillary EPE collected according to the SBS regulation.

Data on the costs of production of ancillary EP services can also be found in the environmental protection expenditures accounts (namely In Table B of EPEA) and in the figures collected through the Joint Questionnaire (current expenditures).

In the case of the RM ancillary activities, since a RUMEA account has not been developed yet, costs of auto production of renewable energy can be deducted from physical data sources, as for example, energy statistics (e.g. combined heat and power plants).

Turnover of Best Pratcices in production system as integrated technologies

Particular cases are also the integrated technologies that are best practices or production systems. In these cases, the activities are ancillary and, in accordance with what is done in the case of ancillary activities, the turnover is the sum of the costs of exploitation incurred to implement the practice.

3.3.4. The turnover of the General Government

The governmental turnover

General Government (GG) carries out non-market production. Therefore, the turnover is equal to the cost of production, as explained above for the corporations' ancillary activities. General Government's turnover is therefore the sum of the personnel costs, the intermediary consumption, the taxes on the production and the consumption of fixed capital.

EPEA's Table B and A

For the environmental protection services, the costs of production can be extracted from the environmental protection expenditures accounts and in the figures collected through the Joint Questionnaire on EPE. In Table B of EPEA, all costs of production and Gross Fixed of Capital Formation are recorded for the General Government in its capacity of producer.

In Table A of EPEA, the expenditures made by the General Government are also recorded, i.e. the value of non-market services produced by General Government and consumed as collective consumption.

Budget analysis

To estimate turnover on GG, it is possible to obtain data via budget analysis. In the budgetary documents, economic information on governmental transactions includes the receipts and uses of funds by the various governments units. However, label of an appropriation is not sufficiently explicit to classify the expenditure as environmental (EP or RM) or not. More information is usually needed, such as a description of the expenditure.

For some institutions whose main activities cannot fully be related to the environment, it is necessary to estimate the respective share. Experts and documents of the corresponding department should be consulted to retrieve the appropriate share.

Allocation to environmental domains : the COFOG

Another source of data which provide useful information in particular for EP services is represented by the data on General Government expenditure by function regularly produced according to the ESA95 regulation. Such source provides in particular data on General Government expenditure by environmental domain according to the Classification Of the Function of Government (COFOG). In COFOG, a full division is dedicated to environmental protection and within this division, 6 groups based on environmental domains of the CEPA are distinguished.

- 05.1: Waste management
- 05.2: Wastewater management
- 05.3: Pollution abatement
- 05.4: Protection of biodiversity and landscapes
- 05.5: R&D environmental protection
- 05.6: Environment protection not elsewhere classified

The allocation of expenditure by a COFOG code is made using the purpose criterion[88] However, as all expenditure should be classified under one and only one position of the COFOG, in some cases, expenditure might be classified under another item than the environmental one.

Unlikely from the case of environmental protection, there is not a full division of COFOG dedicated to Resource Management. RM expenditures carried out by General Government are mainly classified within divisions 4 and 6 of COFOG, together with other non-environmental expenditures, as e.g. energy conservation (COFOG 04.03.05) or forestry management (COFOG 04.02.02).

Some countries' examples of the calculation of the turnover and allocation to the environmental activities are presented in Annex 13.

3.3.5. Asking for turnover in surveys

In order to collect the most accurate data on turnover, the best way to avoid compiling information on non environmental activities is to ask to the respondents to provide their list of environmental technologies and products, to let them select if the environmental technology or product comes from their principal or

[88] This method is explained in the handbook "Environmental protection expenditure statistics: General Government and specialised producers data collection method", Eurostat, 2007.

secondary activities and then ask the turnover belonging to each environmental technology and product.

The data thus collected will include turnover by type of environmental technology and product. In this way, establishments undertaking activities entirely environmental will provide the total turnover of the establishment and establishments undertaking environmental and non environmental activities will be able to isolate the turnover related solely to their environmental technologies and products.

This is the case in Germany (see questionnaire in annex 11).

3.4. Value added of EGSS

3.4.1. Definition

The difference between the selling price of a product and the total value of the expenditure that is engaged to produce the goods and services represents the value added. The use of the value added permits to take into account only the additional value of production and thus avoid double counting within the different steps of the production chain. Using value added therefore prevents an overestimation of the EGSS.

Value added (VA) is an interesting variable in the sense that income, and thereby the economic welfare of a country, depends on value added figures within the country and not on production figures. The economy of a country is not helped by an environmental sector having a large production and a large intermediate consumption of inputs if its value added is low. VA is intended to be a measure of the value created by the productive activity of resident institutional units in the environmental domain. To be comparable to the national level of income, the income created by the EGSS should be evaluated in terms of value added, as the Gross Domestic Product is the sum of all the value added of the national economy.

Definition of value added

According to the National Accounts (2003)[89], **value added at basic prices** by industry is equal to the difference between production (at basic prices) and intermediate consumption (at purchasers' prices)[90].

This means that some taxes on production are included in the value of the production (such as property and payroll taxes on the labour and the capital, but not federal or provincial sales taxes on the intermediary inputs), and that some subsidies are subtracted (such as labour or capital-related subsidies, but not product-related subsidies).

Payroll taxes are payments to government arising out of the input of labour services, and property taxes are levies on the capital services of buildings and

[89] http://unstats.un.org/unsd/sna1993/glossary.asp

[90] The value added at basic prices takes more the point of view of the producers than the value added at factor costs. The value added at factor costs is the value added measured according to the market price (paid by the final consumer) excluding all taxes on production and including all subsidies whether they are granted on intermediate inputs or labour and capital. The difference with the value added at basic price is that only taxes and subsidies on intermediate inputs are treated in this manner.

other property. They are both part of production and are included in the basic price measure. On the other hand, subsidies to labour and capital are deducted from the gross revenues of these factors as they are payments by governments rather than earnings.

The value added variable does not include by definition any kind of intermediate consumption, neither the intermediate consumption of non-environmental products, nor the intermediate consumption of environmental technologies, goods and services. Therefore, differently from the case of turnover, there is no possible double counting in the quantification of the value added of the EGSS, even if the output of some EGSS producers is used by other EGSS producers.

Data on value added can be found at different levels of detail, for example, in National Accounts and SBS statistics.

3.4.2. The value added of the corporations

The corporations' value added

Two approaches can be used for retrieving data on value added for the EGSS. The first approach is based on the population of EGSS enterprises and the SBS statistics. The second approach is to use the value added by NACE calculated by the national accounts.

The value added of the corporations is based on the turnover. To obtain the gross value added, the intermediary consumption should be subtracted of the value of the sales. Intermediary consumption comprises the raw materials, the energy, the services, etc.

As the value added considered in this handbook is the value added at basic price, it only includes the consumption of fixed capital, the personnel costs and some labour and capital-related taxes and product-related subsidies.

NOTE: A method to derive Value Added (and production) from employment figures.

Figures on value added and production of the EGSS are needed in order to fill the standard tables and because they are important economic indicators.

Production and value added can be estimated by combining information on employment retrieved from the business registers in an earlier stage and by using general assumptions based upon information of the National accounts. These general assumptions are based upon rules of thumb deduced from basic economic laws.

Ratios on production per employee and value added per employee are in general roughly the same for every enterprise in a particular NACE class. In other words, the production structure of different enterprises in a particular NACE class is roughly the same. If one makes use of a normally distributed set of companies and one handles a large number of enterprises, these ratios are very useful in order to estimate value added and production.

Ratios on production per employee and value added per employee can thus be calculated for every NACE class at the highest possible level of detail. Then, these ratios of the typical NACE classes can be multiplied by the already retrieved

employment numbers of the corresponding NACE classes. In this way, value added and production can be approximated. To do so, it is recommended to make use of the most detailed NACE information regarding NACE productivity.

Mathematically the approximation of value added and production is written as:

$$VA_{NACE}^{EGSS} = E_{NACE}^{EGSS}\left(\frac{VA_{NACE}^{Economywide}}{E_{NACE}^{Economywide}}\right)$$

$$P_{NACE}^{EGSS} = E_{NACE}^{EGSS}\left(\frac{P_{NACE}^{Economywide}}{E_{NACE}^{Economywide}}\right)$$

Source: Statistics Netherlands, internal note for the Task Force on EGSS, feb. 2009.

The method using the physical output, presented in the sub-chapter related to the corporations' turnover, is also useful to estimate the value added.

For example, an estimated value added for the placement of one kilometre of noise panels or for the treatment of one litre of wastewater can be multiplied by the total kilometres of noise panels placed or the total quantity of wastewater treated.

3.4.3. The value added of the General Government

The governmental value added

For a non-market producer, the output is not calculated on the basis of the turnover, as there are no sales. Gross value added is therefore the difference between total costs of production and intermediary consumptions, excluding also some taxes on production and some subsidies, as described in the definition of the value added at basic price. Then, it equals the sum of personnel costs, consumption of fixed capital and labour and capital-related taxes and product-related subsidies.

3.4.4. Asking for Value Added in surveys

In order to collect the most accurate data on value added through surveys, the best is way to ask the list of environmental technologies and products each establishment produces, if the environmental technology or product comes from their principal or secondary activities and the value added belonging to each environmental technology and product. Thus, compiling information on non environmental activities can be avoided.

The data thus collected will include value added by type of environmental technology and product. In this way, establishments undertaking activities entirely environmental will provide the total value added of the establishment and establishments undertaking environmental and non environmental activities will be able to isolate the value added related solely to their environmental technologies and products.

3.5. Employment of EGSS

3.5.1. Definition

Definition of the employment

Employees in establishment surveys include all persons who work in or for the establishment and receive pay, in cash or in kind, as a rule at regular intervals[91].

The employment that is taken into account for data collection on the EGSS is the employment in environmental enterprises but also in public administrations that are involved in the creation of environmental technologies, goods and services and the employment linked to the ancillary activities in the various productive units. It is the direct environmental employment.

The indirect employment linked to the upstream and downstream activities that produce intermediary environmental technologies, goods and services is excluded when calculating total employment of the EGSS.

Measuring units

Employment should be measured by the full-time equivalent of a year which is the number of full-time equivalent jobs, defined as total hours worked divided by average annual hours worked in full-time jobs[92].

Figures for the number of persons working less than the standard working time of a full-year full-time worker should be converted into full time equivalents, with regard to the working time of a full-time full-year employee in the unit.

Full-time equivalent units are used in annual business statistics to improve the comparability of measures of employment. Included in this category are people working less than a standard working day, less than the standard number of working days in the week, or less than the standard number of weeks/months in the respective year. The conversion should be carried out on the basis of the number of hours, days, weeks or months worked[93].

Complementary information

Although the Standard Tables require only the employment figures, when possible a complementary analysis could be done to explore, for example, gender data in order to know the gender patterns of the EGSS employment in the country. Additional information of value is for example educational levels.

3.5.2. The employment of the corporations

The employment of the corporations' principal and secondary activities: direct results

Usually labour employed in the production of technologies and products of the entire environmental corporations, easily identified according to NACE classes, is straightforwardly accounted for. As statistical registers provide generally data by NACE category, employment for these corporations can quite readily be extracted from these registers. Furthermore, when the entirety of the activities is environmental, all employees are considered as environmental ones. In these cases (when the NACE class is considered as 100% environmental), there is no need for estimations of environmental shares. If data is only available in number of employees, these figures will need to be converted in full-time equivalent.

[91] OECD glossary, http://stats.oecd.org/glossary/
[92] System of National Accounts (SNA) 1993, par.17.14 [15.102, 17.28]
[93] Extract from the definitions of SBS Regulation variables (16 14 0)

However, estimations will be needed if the production of environmental technologies and products constitute only a secondary activity of an establishment, or, if it is a principal activity, is combined with secondary activities in the same establishment, i.e. when the NACE class is not 100% environmental. As employment is generally allocated in the registers and existing statistics to the principal activity, unless available data allow a clear separation, the employment of the EGSS may be underestimated in the first case while it is likely to be overstated in the second case. This means that it is necessary to know the environmental share and how to allocate employment. To do so, different methods exist and are presented below.

The employment of the corporations' principal and secondary activities: estimation from the shares of environmental producers

Methods based on estimated coefficients can be used to estimate employment data from existing statistical data. By establishing a correspondence between environmental producers and total producers listed in standard statistics, it is possible to estimate the share of total producers of environmental technologies and products.

For example, as it can be done for the estimation of the turnover, if the results of a survey show that x% of industrial equipment suppliers produce technologies and products with an environmental purpose, this share can be applied to estimate the environmental employment in this sector.

Estimation of employment from turnover

Once turnover has been appropriately estimated, an approach is to co-relate it to environmental employment. It is the method used by Germany when data on environmental employment are not available directly.

It is assumed that the share of environmental employment in total employment is equal to the share of environmental turnover in total turnover. The ratio environmental turnover to total turnover is thus applied to the total employment of the corporation.

$$eE/tE = eT/tT \quad \rightarrow \quad eE = (eT \times tE)/tT$$

Where: eE = number of environmental employees
tE = total number of employees
eT = environmental turnover
tT = total turnover

However, employment estimated via coefficients based on turnover could suffer of the double-counting problem linked to the calculation of the turnover. As it is explained in Chapter 4.3.2 related to the double counting problem and in Chapter 4.4.1 related to the value added, the calculated environmental part equal to the environmental turnover on total turnover can be higher than it should if no attention is paid to the intermediary consumption of environmental technologies and products. As it is not always possible to identify intermediate environmental consumption, the turnover used (including or not the environmental intermediate consumption) to estimate the employment should be mentioned in the footnotes of the Standard Tables (see Chapter 5).

Coefficients can preferably be based on the value added that avoids all double counting and therefore the potential overestimation of the employment.

These aggregate-level ratios can be estimated using the data from, for example, the Structural Business Statistics.

Another ratio that could be used is the one of the environmental revenues (if this information is available) to total revenues at the sector level. This ratio should then be applied to the total employment. However, the top contributors, i.e. the ones who employ the most environmental workers, risk to lead to an overestimation of the global ratio and then to influence the calculation of the environmental employment.

One alternative to aggregate-level ratio is the use of enterprise-level ratios. This approach aims to minimize the influence of the top contributors in the calculation of the ratio of environmental revenues to total revenue for each sector.

Then, for each establishment, the ratio "environmental revenues to total revenues" is calculated (when environmental revenue is available). This ratio is applied to the establishment's total employment in order to obtain an estimate of environmental employment. These establishment-based results are then used to produce aggregate-level results by sector.

These different methods to estimate environmental employment could provide very different figures. For example, Canada has estimated employment figures for the EGSS using three methods (i.e. the methods of estimation with ratio at aggregate-level, at the firm level and with direct response survey) in order to test and compare them. The annex 13 illustrates the results.

Estimation of the employment from the productivity

Ratios of productivity can exist at national level and are an interesting alternative to the ratios of environmental revenues to total revenues. The productivity gives the amount of production done by a certain number of employees. Thus, once the environmental production is known, it is easy to estimate the number of employees required to do it.

Two different ratios of productivity can be used:

- the ratio of productivity for the NACE sector entirely related to a particular environmental activity in another NACE sector. For example, to estimate the environmental employment in the waste treatment domain in an enterprise that carries out this activity as secondary activity, the productivity of, for example, the NACE 37 or 38 can be used. This method is used by Austria, as explained in Annex 13.

- the global ratio of productivity of the concerned sector. As the environmental production is known, the same productivity as for the global production could be used to know the employment linked to the environmental part of the activities.

The employment of the corporations: ancillary activities

In the case of ancillary activities, employment can be estimated via the environmental expenditure. The expenditures related to the compensation of employees for the ancillary environmental activities can be calculated based on the ratio costs of production for environmental ancillary activities to total costs of production.

To these wages and salaries is then applied an average wage by employee in order to find the number of full-time equivalent employment. This average wage can be estimated at sector level via the Labour Statistics by dividing the total employment by NACE sector by the total compensation of employees of the same NACE.

3.5.3. The employment of the General Government

The employment of the General Government

It is possible to extract compensations of employees for environmental employees for the NACE 84, “public administration” in the environmental expenditure statistics. To these wages and salaries is then applied an average wage by employee in order to find the number of full-time equivalent employment. This average wage is estimated via the Labour Statistics by dividing the total employment of NACE 84 by the total compensation of employees of this NACE.

It is also possible to obtain data on GG environmental employment using data on the environmental functions of the COFOG as the compensation of employees is a variable that is detailed by these functions for the global sector of the General Government. To these wages and salaries can be applied an average wage by employee of the public administrative sector in order to find the number of full-time equivalent employment. This average wage is estimated via the labour statistics by dividing the total employment by NACE sector by the total compensation of employees.

3.5.4. Asking for Employment in surveys

The questionnaire should include a section on environmental employment. Specifically, the survey should ask the following question: "Of the total employment of your establishment, please estimate the proportion of your employees who spent any time in the production/provision of environmental technologies, goods and services or carried out environment-related activities. Please report the number of full-time employees”.

Ideally, this section should breakdown environmental employment in principal, secondary, ancillary and total activities (environmental and non environmental) and should explain how to estimate the number of full-time employees.

3.6. Exports of EGSS

3.6.1. Definition

Definition

Exports of technologies and products consist of transactions in goods and services (sales, barter, gifts or grants) from residents to non-residents[94].

Exports are not relevant for the governmental part of the EGSS. Therefore they are only to be compiled in the corporations’ part of the Standard Tables (see Chapter 5).

Data is required in order to obtain a picture of the extent, destination and growth trends of EU environmental sector exports. If the EGSS population can be linked

[94] European System of Accounts (ESA) 1995, [3.128]. An institutional unit is resident in a country when it has a centre of economic interest in the economic territory of that country. An institutional unit has a centre of economic interest within a country when there exists some location - dwelling, place of production, or other premises - within the economic territory of the country on, or from, which the unit engages and intends to continue engaging, either indefinitely or over a finite but long period of time, in economic activities and transactions on a significant scale. The location needs not to be fixed so long as it remains within the economic territory. On the contrary, a unit is non-resident if its centre of economic interest is not in the economic territory of a country.

to trade statistics, trade on goods can be found directly. If the EGSS population cannot be linked to trade statistics on establishment level, other means (such as estimation on the basis of ratios and targeted surveys) are available to account for their exports. However, the process is less accurate and large portions of the EGSS could be unaccounted for. For example, environmental technologies and products not specifically identifiable in trade codes could easily be missed[95].

3.6.2. The exports of the corporations

Different approaches can be used to compile data on exports of the EGSS.

The exports of goods : focusing on activities and/or products

A straightforward approach is that of calculating total exports of environmental activities from the population database and relevant trade statistics. This approach gives reliable figures for corporations whose production and thus exports are 100% environmental by definition and can be easily identified in a register (for example business register or trade register).

For corporations which are not producing only environmental technologies and products, estimation techniques (e.g. calculation of share) could be tempting. However, national statistics rarely provide hints to estimate the share of environmental goods that are exported by corporations compared to both, environmental and non-environmental goods. A survey for each NACE class that undertakes environmental activities or a survey by environmental technologies and products seems to be the better way to obtain reliable data.

Focus on products

Another approach would be to pick up products from trade statistics. Usually foreign trade statistics are organised on the basis of products classifications for tariff and customs purposes. Exports data from foreign trade statistics for each establishment can be found as long as it is possible to link companies to goods produced and services provided. If the product classification used in the trade register is detailed enough to differentiate between environmental and non environmental goods, then the exports of secondary environmental producers can be found.

The advantage of this approach is that it enables to distinguish between the different goods that are exported. By using this approach it is possible to obtain reliable trade statistics on the export of environmental goods. But this is only as long as product classifications allow to distinguish between environmental and not environmental goods and thus discard those which are not environmental goods.

Disadvantages of this procedure are the following: existing products classifications are not exhaustive with regards to environmental goods and services; many environmental products are encoded in large categories including both environmental and non environmental goods. Thus the necessity of estimation techniques for finding the share of the products that can be considered environmental appears again. Data sets can be very large (products classifications contain more classes than economic activities classifications) and thus handling these data can be difficult and time consuming.

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[95] Nevertheless countries experiences and previous studies on EGSS (e.g. ECOTEC, (2002), "Analysis of the EU Eco-Industries, their Employment and Export Potential", as well as the OECD papers on EGSS) are of great value in tracing a certain number of strategies to obtain data on trade of the environmental sector.
In addition, the WTO is negotiating tariffs reduction for a certain number of environmental goods and services as part of the Doha Round of trade liberalization. Members are currently defining a list of environmental goods and services. This list could be useful in the definition of the EGSS population as well as in the assessment of EGSS exports. It is illustrated in Annex 6.

Statistics Sweden decided to investigate the possibilities of estimating the sector from a product perspective. The conclusion of this pilot study was that product classifications are well suited to find establishments and complete the coverage of EGSS population but they are difficult to handle for getting data on environmental exports.

Usually services are excluded from this approach, since most products classifications and also the foreign trade registers do not take into account services.

The exports of services

Some services are defined through abstract concepts rather than by any physical attribute or physical function. For trade in services there is no "package" crossing the customs frontiers with an internationally recognised commodity code.

Data from the balance of payments

In order to pursue liberalisation in the service sector, WTO negotiations are focusing on a list of 12 services sectors (business, distribution, communication, educational, financial, consulting, environmental, health, tourism, engineering, transport, sporting services and others). These categories are based on the UN Central Product Classification (CPC).

The CPC provides also sub categories for each service sector. In the case of environmental services sector, the categories encompass four specific sub-sectors: (A) sewage systems; (B) refuse disposal; (C) sanitation and similar services; (D) other environmental services.

The classification used to negotiate tariff reductions reflects the classification of services for statistical purposes currently adopted by the UN Statistical Division. This classification derives from the Extended Balance of Payments Services Classifications (EBOPS) that can be put into correspondence with the CPC product classification[96] and the ISIC (NACE) classification[97].

Data for services classified by the EBOPS come from the balance of payments (BOP) statistics. BOP statistics provide a systematic summary of economic transactions between an economy and the rest of the world, for a specific time period. The transactions included comprise: goods, services, income, transfers and financial claims.

GNS/W/120		CPC 1.0	EBOPS	ISIC 3.1	NACE 1.1
Environmental services					
Environmental services	A) Sewage services	94110 Sewage treatment services	282 Waste treatment and de-pollution	9000	90
		94120 Tank emptying and cleaning services	282 Waste treatment and de-pollution	9000	90
	B) Refuse disposal services	94211 Non-hazardous waste collection services	282 Waste treatment and de-pollution	9000	90
		94212 Non-hazardous waste treatment and disposal services	282 Waste treatment and de-pollution	9000	90
		94221 Hazardous waste collection services	282 Waste treatment and de-pollution	9000	90
		94222 Hazardous waste treatment and disposal services	282 Waste treatment and de-pollution	9000	90
	C) Sanitation and similar services	94310 Sweeping and snow removal services	282 Waste treatment and de-pollution	9000	90
		94390 Other sanitation services	282 Waste treatment and de-pollution	9000	90
	D) Other	94900 Other environmental protection services	282 Waste treatment and de-pollution	9000	90

[96] Manual on Statistics of International Trade in Services, Annex III
[97] Manual on Statistics of International Trade in Services, Annex IV

GNS/W/120		CPC 1.0	EBOPS	ISIC 3.1	NACE 1.1
Environmental services in other service categories					
Business Services	A) Professional services (e. engineering services)	83131 Environmental consulting services	280 Architectural, engineering, and other technical services	7421	7420
		83139 Other scientific and technical consulting services	284 Other business services	7421	7420
	A) Professional services (g. urban planning)	83221 Urban planning services	280 Architectural, engineering, and other technical services	7421	7420
		83222 Landscape architectural services		7421	7420
	C) Research and development services on natural sciences	81110 to 81190	279 Research and development	7310	7310
	F) Other Business services *(e. Technical testing and analysis services)*	83561 to 83569	280 Architectural, engineering, and other technical services	7422	7430
	F) Other Business services (*f. Services incidental to agriculture)*	86111 to 86140	283 Agricultural, mining, and other onsite processing services	0200	0201, 0202
	F) Other Business services (*g. Services incidental to fishing)*	86150	283 Agricultural, mining, and other onsite processing services	0500	0501, 0502
	F) Other Business services (*m. Related scientific and technical Consulting services)*	83510 to 83550	280 Architectural, engineering, and other technical services	7421	7420
Construction and related engineering services		54111 to 54800	249 constructions services	4520 to 4550	4521 to 4550
Tourism and travel related services		63110 to 63300	957 Expenditure on accommodation and restaurant services	5510, 5520	5511 to 5552

Table 3.2 : Environmental services classification

The Manual on Statistics of International Trade in Services sets out an internationally agreed framework for the compilation and reporting of statistics of international trade in services in a broad sense. It addresses the growing needs for more detailed, more comparable and more comprehensive statistics on this type of trade in services in its various forms. The Manual conforms with and explicitly relates to the System of National Accounts 1993 and the fifth edition of the International Monetary Fund's Balance of Payments Manual.

BOP statistics can be useful sources of data for trade in services. The aggregate data for waste treatment and de-pollution are usually available for all European countries. Unfortunately, it is more difficult to obtain data for subsections and for other environmental services scattered across other sections.

Environmental services are classified in the EBOPS with the code 282, waste treatment and de-pollution services, and they encompass a certain number of services related to waste management. Waste management covers services that are included in particular a NACE class. Other environmental services scattered in other classes are also reported in the Table 3.2. For example, it is clear that many other environmental services are scattered across the other sectors, in particular into consulting and engineering.

Other source to rely upon for finding data on exports of services are environmental protection expenditure accounts.

Data from the EPE accounts

Table B1[98] of the EPEA presents supply and uses of the different categories of EP services. Some additions, subtractions and revaluations are made starting from domestic production.

		Non-market EP services	Market EP services	Ancillary EP services
USES	Final consumption	X	X	-
	Plus intermediate consumption	-	X	X
	Of which by specialised producers	-	X	-
	Of wich by other producers	-	X	X
	Plus capital formation (and improvement)	x	x	(x)
	Plus exports	-	(x)	-
	Equal total uses (at purchasers' price)	X	X	X
SUPPLY	Output (basic prices or cost of production)	X	X	X
	Plus imports	-	(x)	-
	Plus non deductible VAT	-	X	-
	Plus taxes on imports other than VAT	-	(x)	-
	Plus taxes on products other than VAT	-	(x)	-
	Less subsidies on products	-	(x)	-
	Equals total supply at purchasers' price	X	X	X

X important; x often small; (x) often very small / can be ignored; - not relevant / zero by definition

Table 3.3: Table B1 (the supply-use table for environmental protection activities) of EPEA (source: SERIEE Environmental protection Expenditure Accounts – Compilation Guide).

In principle imports are added and exports subtracted. Thus, EPE accounts, and in particular Table B1, could be of valuable help as a source of data on trade of environmental services. However this is limited only to environmental services, usually provided by environmental specific services producers (specialised producers)

Nevertheless the SERIEE/EPEA Compilation Guide underlines the fact that imports and exports of EP services are usually very limited. In particular it highlights some specific cases which need to be checked to avoid mistakes such as cross border waste or wastewater treatment for municipalities that treat their waste in another country, treatment of radioactive waste or other special wastes abroad or recycling of waste in another country.

Other sources to rely upon for finding data on exports of services are the business registers, estimation from VAT registers and surveys.

Many reasons could make the above mentioned approaches not feasible or not reliable (NACE classification does not allow defining the EGSS; product classifications for corporations do not reflect the distinction between environmental and non environmental products or do not include services, etc...). The feasible alternatives are surveys.

[98] Some examples can be found in Eurostat, SERIEE Environmental protection Expenditure Accounts – Compilation Guide, Luxembourg, 2002, p. 80.

3.6.3. Asking for Exports in surveys

In order to collect the most accurate data on exports through surveys, the best way to avoid compiling information on non environmental technologies and products is to ask the production list of environmental technologies and products for each establishment, if the environmental technology or product comes from their principal or secondary activities and the level of exports belonging to each environmental technology and product.

The data thus collected will include exports by type of environmental technology and product. In this way, establishments undertaking activities entirely environmental will provide the total exports of the establishment and establishments undertaking environmental and non environmental activities will be able to isolate the exports related solely to their environmental technologies and products.

This is the case in Germany (see questionnaire in annex 11).

3.7. Assessing the quality of the data

Methods used for compiling data should be relevant for an acceptable quality of the results and for the comparability of the data between countries, two issues that are important for the users of the statistics.

There are also many common tasks and problems which are independent of the chosen methodology (for example, how to convince the enterprises to send their replies when using surveys, how to cope with demands from policy-makers and enterprises to reduce the response burden, how to make maximum use of a limited budget and/or availability of staff, etc).

However, to decide what is the most appropriate method will be dependent on the specific situation in the countries (national priorities, budget and staff available, survey traditions, etc). The collection of information should be time and resource-efficient and produce robust results.

It is crucial to ensure the best possible coverage of sectors (corporation and government), economic activities (market/non-market, principal/secondary, etc), outputs (environmental technologies, goods and services) and environmental activities (environmental protection and Resource Management) for the environmental sector so that its full economic contribution can be assessed.

As different methods of data collection pose some questions of data availability, data coverage and resource efficiency, those methods that best fulfil information needs should be used.

For example, some establishments involved in EGSS might not be included in the database on EGSS. As mentioned in previous paragraphs, the data for the establishments of the EGSS database can be obtained from different sources using existing statistics and registers. This way to proceed can be combined with surveys data to provide a more complete picture of environmental production while minimizing response burden. Taken together, this information will allow for the development of national estimates on EGSS. Once all data compiled, this information can be used by the users of the statistics (businesses for market

analysis, trade associations to study the performance of the environmental sector, governments to develop policies, researchers, etc).

Quality of the data can be analysed and improved by estimates of missing parts or identification of inconsistencies. Where similar statistics from various sources (surveys or statistics calculated from administrative data at the national level by the Official Statistical System) exist, they should be identified and any differences should be analysed and, if possible, quantified.

A discrepancy between two sets of statistics produced by different data sources or surveys may be due to differences in the data collection process or differences in reporting units resulting in different estimates.

The situation may be improved by benchmarking (for instance monthly or quarterly statistics on annual results) or by combining different results.

Statistics on EGSS emanating from different sources can thus be analysed and compared and if possible balanced for example through the use of the accounting framework of the SERIEEs Environmental Protection Expenditure Accounts (EPEA).

Other possible sources of information (mainly for cross-checking) are organisations that routinely collect environmental information as part of their usual activities. For example, environment protection agencies usually collect data as part of their monitoring and regulation programmes. Government organisations responsible for employment and training policy may obtain data from businesses through various environmental-employment generation programmes. Further information may be obtained from databases on research and from development projects for waste management and pollution control.

Trade associations or specialised business associations are a further source of information on the EGSS. Trade associations regularly issue information on parts of the EGSS, and some associations regularly publish data on their members. However, in order to obtain more objective data, it is not recommended to use associations as sources for data but only for identifying establishments of the Environmental Goods and Services Sector and for crosschecking purposes.

Annex 10. Demand side approach

This annex contains some information on the demand side and the combination of the demand and supply side approaches[99].

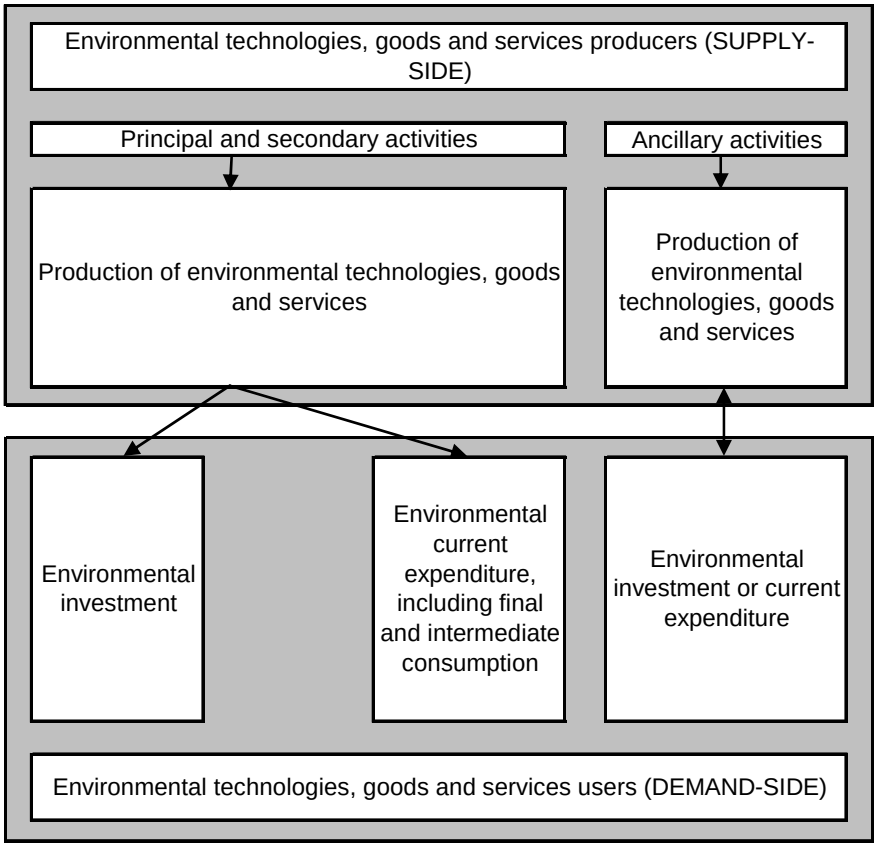

Figure A10.1 : Supply versus Demand- side approaches

The demand-side approach

Demand-side approaches are characterised by the use of information that allows quantifying the demand for environmental technologies, goods and services. This is generally done from data on expenditure for environmental protection and Resource Management.

When demand side data is used to estimate variables of EGSS, the method requires data on employment, national/regional production, imports and exports. The results obtained can cover the whole environmental sector (including secondary and ancillary activities and some government activities) and include as well a part of cleaner technologies.

The problem is that the interpretation of the results is subject to the assumptions implicit in the estimations and the data may be inaccurate. Although it allows estimating turnover of ancillary activities (for the whole environmental sector) and employment effects (indirect employment), it does not cover data on exports. However, the demand-side approach can help to provide and improve data on a part of the environmental goods and services sector.

[99] Some more information can be found in Chapter 2 of the Environmental Industry OECD/Eurostat Manual (1999).

Demand-side approaches will pick up all environmental goods and services expenditure irrespective of the source; it will include ancillary activities and will exclude the production of non-environmental goods and services even when this comes from principal producers of environmental goods and services. On the other hand, although it may be fairly straightforward to measure the amount of money spent on environmental protection by domain, expenditure data cannot precisely identify the kind of products concerned.

The total expenditure of consumers of environmental technologies, goods and services is also a proxy of the production and then the EGSS turnover. However, some precautions must be taken. Each type of consumers' expenditure is associated to a production that is divided in national production and imported production. The national production is a generator of national turnover whereas imported production is expenditure without a national turnover counterpart. To obtain national turnover, imported production must therefore be deducted and exported production added as it generates national activities without national expenditure and consumption.

The environmental employment can also be derived by the production estimated on the basis of the consumption of the environmental goods, services and technologies.

The population of the EGSS concerned by the consumption is made of firms, households and public authorities. These consumptions are translated into expenditures, current or capital, in each environmental domain.

The expenditures by activity are broken down into different products. Each product is then associated to a production that is divided in a national production and an imported production. The national production, even if it is for the export, generates employment, on the contrary of the imported production. The imports are therefore deducted from the total of the production. Inversely, export, which represents the foreign demand that creates jobs but does not generate expenditures, is added.

To these various types of production, the ratio number of persons employed/turnover exclusive of tax for the sector or sectors of activity in question can be applied in order to evaluate the corresponding number of jobs. This ratio can be taken, for example, from the annual business surveys for well-identified activities or national accounts for some aggregated groups of products.

One limitation is that more assumptions have to be made. The demand is linked to a production via approximations and the production is linked to employment via other approximations.

According to the demand-side approach, statistics or estimates on public and private expenditures are used to derive final demand vectors for input-output calculations. Input-Output tables describe the sales and purchases relationships between producers and consumers within an economy. The analysis requires the translation of output into employment by corporation. This is accomplished by utilising data on manpower requirements, man-hours and productivity within each sector. The use of a corporation-occupation matrix and corresponding employment/output coefficients allows estimating the number of jobs induced by environmental expenditures.

On the other hand, pollution prevention investments data can be used to measure cleaner technologies and products. However there are some caveats in reading and interpreting these statistics: the SERIEE approach considers "cleaner" technologies and products that are more costly to produce than the equivalent less-clean alternative products. In this case, only the extra costs are considered as environmental protection expenditure. This requires comparing the price of the clean product with that of the superseded item. However, the supply side approach records the entire cost of cleaner technologies and products. Also there can be the case of technologies which are less polluting as well as less costly to produce. This means, in practice, that if a firm develops an engine that is cheaper to run, but that just happens to be cleaner as well, there are no extra costs involved to be recorded. In addition, the data probably underestimate expenditure on cleaner products and cleaner (integrated) technologies because of measurement difficulties, such as identifying cleaner products, which means that they are only partially included in the estimates.

The demand side approach ensures consistency and provides information on most economic variables for the EGSS as a whole. It allows assessment of ancillary activities and avoids the problem of having to identify and estimate environmental shares of multi-purpose goods.

However, interpretation of the results is subject to the assumptions implicit in the estimations. In conclusion, demand-side approaches are a very useful adjunct to supply-side measurement in crosschecking the information gathered, and are an important source of data for assessing parts of the EGSS which are otherwise difficult to capture *(e.g.* ancillary activities).

Combining supply and demand side approaches

Combined supply- and demand-side approaches benefit from strengths of both approaches on the one hand by overlapping and double-checking each method, and on the other hand by compensating respective weaknesses. Furthermore, the integrated demand/supply approach can be developed at a deeper level of detail by using data on environmental protection expenditure and integrating the data available on the supply side together with engineering data and case studies for both supply and demand.

By integrating supply-side information with expenditure/demand for environmental goods and services, it is possible to obtain a general and aggregate picture of the environmental goods and services sector, although it may be rather weak in detail and thus require further detailed investigations.

Reconciling supply- and demand-side estimates for economic production is an important and integral part of the *System of National Accounts* (SNA). SEEA and SERIEE cover many aspects of environmental accounting, including the development of accounts for specific environmental assets in physical terms as well as attaching monetary values to these assets. Of particular interest in this context, is the elaboration of a supply and use table, which specifically identifies environmental protection goods and services.

Using an integrated approach may thus help to reconcile information on both sides in a consistent accounting work, it may also provide a more comprehensive picture of the total turnover and employment in the environmental goods and services sector. Moreover, this integrated approach may help in assessing the turnover and employment effects by providing a sound basis for estimates.

Annex 11. Estimating variables using surveys

Survey is the best method as far as data coverage and quality are concerned. However, this method presents some weaknesses such as the cost of implementation, particularly if the population is rare or hard to reach, as it is the case with the EGSS. This annex presents advantages and disadvantages of this method and some examples from countries using this tool. It is important to point out that the definitions used in the exemplified questionnaires are not always consistent with those adopted in this Handbook.

The principal strength of a survey is precision. Information can be very detailed. However, in order to receive the appropriate answers the instructions to the questionnaire need to be easy and not too comprehensive. Standardised questionnaire design and administration means that there is little flexibility to be able to deal with respondents' misunderstanding the question (or its intention), leading to problems of validity. The need of flexibility is however more easily met in a separate survey that is clearly destined and created specifically for some respondents.

A survey is a suitable instrument to get information on turnover, value added, exports and the labour employed in the production of environmental goods ad services when these are marketed. But it might be difficult to survey the environmental share of turnover and employment for secondary activities and for non market activities.

Concerning the coverage of environmental activities, surveys often exclude part of the population, which is a normal phenomenon in statistics. There is also the risk that data may contain information on non-environmentally related goods and services. This may happen inadvertently or because the establishment is simply unable to distinguish between environmental and non environmental goods, services and technologies.

Adding questions to existing surveys

In order to minimise the cost of implementing a survey, questions on EGSS can be added to existing surveys in the field of “economic” or “environmental protection expenditure” or “innovation” statistics.

The part of a survey that relates to EGSS can be sent to all units or to a sub-sample of those that receive the other surveys. It could be totally integrated in the “mother survey” or be in the form of a separate leaflet, possibly of a different colour to highlight the different subject.

It is often difficult to add a large new section of questions in these existing surveys in terms of number of variables, breakdowns, or detailed explanations in the questionnaire.

The main advantage of this method is the use of an existing survey structure (process), which minimises the costs for the basic survey tasks for the statistical office (printing, sending out, data entry, etc.). This makes it possible to provide information also with a limited budget, or free resources which, for example, could be used for quality controls.

Another advantage is the flexibility to introduce additional variables. It is often easier to add an extra variable to an existing survey, than to launch an entirely new survey.

The main disadvantage is that the questionnaire is generally answered by people who are not specialists in the field and who might not have the necessary information, knowledge, or interest to answer the survey, or to report accurately the variables on EGSS. In addition, the total costs for the respondents could be higher compared to a separate survey with a targeted sample and more developed guidelines.

When executing a non-independent survey it is recommended to focus specific attention to some issues related to non-response and quality of response.

There is a clear risk that less priority is given to the environmental part. This is because the environmental part is a small part of a survey which mainly addresses other issues and which is answered by respondents who are not experts in the field. This could result in both low qualities of the data reported and by higher rates of non-response. Attention should be paid, in particular, on the treatment of returned questionnaires where the environmental part is not filled in: this could be due to a non-response or to the lack of environmental output.

Another risk to consider is that people who are not used to the subject and who receive only limited instructions, in the end report either too little or too much compared to the definitions and classification of EGSS. Probably there is particularly a risk of underestimation, but experience also shows that enterprises are often eager to show what they do to protect the environment or preserve natural resources. There is an inclination to report the information they have (or consider relevant) although this does not correspond to the definitions and delimitation in the questionnaires. This is a general problem, but the risk could be higher for non-independent surveys since these often include only a very limited number of variables and cannot count on extended notes for informing on the definitions and classifications.

Hungary uses existing surveys with supplementary questions to collect data concerning pollution management, cleaner technologies and products and also environmental products and services for own uses. A distinction is made between products, services and construction. Net return of sales, exports and average number of employees are inquired and are specified according to the environmental domain. Furthermore, the proportion related to the overall activity of the organisation is asked for the net return, the exports and the average number of employees.

An example of these questions is presented in figure A11.1.

Using targeted surveys

In designing and implementing a survey for the environmental sector, the following issues should be addressed: target population and sample design, development and design of a questionnaire. errors detection, imputations and estimations, quality evaluation and revisions/adjustments.

The target population consists of establishments operating at national level that are involved either in whole or in part in the production of environmental technologies and goods or the provision of environmental services in all economic sectors.

As for any other survey, once the population is established, the sample will be specified according to needs. The sample should be as representative as possible reflecting the structure of the environmental goods and services sector.

Part of the questionnaire must be dedicated to a careful explanation of the reasons for and aims of the survey, together with instructions on how to compile the answers to avoid inappropriate responses.

Concerning the elaboration of the questionnaire, experience shows that the longer the questionnaire, the lower the response rate. It is recommended that specific surveys collect, at a minimum, data on the four economic variables of the standard tables: turnover, value added, employment and exports, for the whole units' breakdowns.

It is recommended that the questionnaire include a filtering mechanism to ensure a clear distinction between establishments that satisfy the definition for inclusion in the EGSS and those that do not. This could be done, for example, by setting out, at the beginning of the questionnaire, the reasons why

establishments have received the form, and how to respond if they have no environmental activity (e.g. by asking them to specify their activities). This will exclude a situation in which establishments that do not provide environmental technologies, goods and services are inadvertently included in the population. Thus, problems with the reporting and analysis of results, in particular for the grossing up procedures, will be avoided.

For the cases of activities providing both environmental and non-environmental output, it is recommended to ask respondents to identify and report the portion which they recognise as being environmental and to specify how the allocation is made.

In general it is recommended that any additional information requirements be weighed in terms of survey cost and the likelihood of lower response rates.

Targeted surveys are the best and most comprehensive tools for providing information on exports of technologies, goods and services. For example, information can be provided as a share of total environmental turnover, with a very limited breakdown by main destination.

Germany has developed a specific questionnaire related to goods and services for environmental protection. Asked data are types of environmental goods manufactured in the surveyed enterprises and sales revenue achieved with these goods in the local units surveyed. If sales revenues are obtained with services for environmental protection, an additional form must be filled out.

This questionnaire consists of tables, definitions and instructions. Definitions and a list of examples of goods used solely for environmental protection are also given as footnotes at the end of the questionnaire. An example of the German questionnaire is presented in figure A11.2.

The EGSS survey questionnaire can undergo various transformations since its inception. Pilot studies, involving a limited group of respondents, can be performed as a means of initial testing of content and terminology. A series of one-on-one interviews with corporations can be conducted to test and to collect feedback on the survey questions.

The classifications should ideally remain constant over the time. However, it is clear that there will be significant changes involving the expansion and shift of the categories of environmental technologies, goods and services.

The questionnaire should ideally be addressed to a contact person who is either responsible for, or has knowledge of, the environment-related operations of the establishment. Mail, telephone and fax follow ups should be carried out to elicit response from non-respondents or inconsistencies from respondents.

Validity tests can be applied during data entry.

If the number of establishments comprising an enterprise is too large for conventional data collection, to facilitate reporting in these cases, data can be collected through larger reporting entities other than the establishments. The data contained in these reports can subsequently be allocated to individual establishments based on related characteristics.

Completed and returned questionnaires can be checked using automated programmes (that, for example, can verify that all relevant information has been completed and that reported values are within acceptable ranges based on historical data).

Data should be corrected, where possible, with the assistance of the respondents.

Residual errors, missing data or inconsistencies can be solved by statistical adjustments using historical or administrative data, or by imputing (substituting) consistent data from respondents with similar characteristics.

As part of the production of final estimates, sampled data should be weighted to produce estimates representative of the target population.

Year-over-year comparisons should be made by sector, by environmental domain and by kind of activities, while taking into account any changes in the survey or changes in government regulations or policies which may have an impact on the EGSS.

Year over year it could also be necessary to make revisions and adjustments.

The methodology of the survey should be designed to control errors and to reduce the potential effects of these. However, the results of the survey can remain subject to error in a number of areas, including coverage, non-response, response, processing and, to a limited extent, sampling.

The mailing list for survey respondents should be compared with various industry directories and supplemented with information from statistics, registers, etc. Normally, every year new establishments will be identified as being in-scope for the survey. Continuously research should be done on the establishments falling under the scope of the EGSS. This will allow for the continual updating and verification of establishments that should be contained in the survey frame.

Code:

1. Pollution management

Number	Environmental activity	Products			Services			
		Net return from sales (thousand Ft)	Of which: exports (Thousand Ft)	Average number of employees (persons)	Net return from sales (thousand Ft)	Of which: exports (Thousand Ft)	Average number of employees (persons)	Net return sales (thous
	a	b	c	d	e	f	g	h
1	Air							
2	Wastewater							
3	Collection and treatment of municipal liquid waste							
4	Hazardous waste (collection, treatment and disposal)							
5	Non-hazardous waste (collection, treatment and disposal)							
6	Waste recovery and recycling							
7	Remediation and clean-up of soil, surface water and groundwater							
8	Noise and vibration abatment							
9	Protection of nature and landscape							
10	Environmental research and development							
11	Environmental consulting, environmental management system							
12	Education, training							
13	Other							
14	**1-13 Total**							
15	Proportion of the overall activity of the organisation (%)							

Products, services and construction are anal
For each, sales, exports and employment are
These are classified according to the type of
environmental activity, i.e. the environment
domain

Code:

2. Cleaner technologies and products

Number		Net return from sales (thousand Ft)	Of which: exports (thousand Ft)	Average number of employees (persons)
	a	b	c	d
1	Cleaner technologies			
2	Cleaner products			
3	**Total (1+2)**			
4	Proportion of the overall activity of the organisation (%)			

Cleaner technologies and pro
asked in a separate table

3. Environmental products and services for own use

Number		Expenditure (Thousand Ft)
	a	b
1	Environmental products and services for own use	

Expenditures for the production of ancillary activities are asked separately

Figure A11.1 : Hungarian survey on EGSS

Name of the authority Logo

Survey of goods and services for environmental protection 2006, (Germany)

For legal bases and information please refer to the explanations which are an integral part of this questionnaire.

Name of the authority
Organisational unit
Street and street number

Postal code, town

For queries please call
tel: (+49)

Contact:
Mr.
Ms.
Fax:

E-mail:

Please return by:

Postal address of the authority

Contact for queries (voluntary):

Name, telephone, fax or e-mail:

Place, date, signature:

Thank you for your co-operation!

Identification number (please indicate in queries):

1 0

If address or name no longer applicable, please correct on page 2!

1 Please indicate how many employees work for environmental protection in your local unit: [1]

10 - 15

2 Please indicate the turnover you achieved in 2006 with goods produced in your local unit and serving environmental protection purposes or with construction operations or services for environmental protection. [2]

If you are a **general contractor**, please indicate only the turnover achieved by yourself, excluding turnover achieved by subcontractors. **Public enterprises** should indicate only the services they provide by order of third parties and against invoice. Services provided from the current budget because of legal obligations should not be included.
Please check whether you produce goods or perform construction work or provide services that are indicated in the list of goods, construction works or services below. If so, please use the designation of the type of good / construction work / service (column 2) and the code number (column 1) and indicate the turnover in columns 3 to 5. Other turnover achieved with goods and services serving environmental protection purposes and not contained in the list should also be indicated. In that case, please indicate the type in column 2, while the box "code number" (column 1) will remain empty.
Please enter your data according to the **main purpose** of the goods and services for environmental protection. Please make sure not to enter data several times.

Code number	Type of good / construction work / service	Turnover achieved		
		together	with domestic customers	with foreign customers
		in full EUR		
1	2	3	4	5
16 - 20		21 - 32	33 - 44	45 - 56
	Examples:			
1 9 1 0 4	Vehicles for landfills			
2 0 3 0 1	Construction of noise protection embankments			
3 0 6 0 1	Inspections and analyses for soil decontamination, e.g. examination of contaminated sites			
	Other goods/ construction works / services for environmental protection:(see list on pages 4 to 6)			
	....			

Figure A11.2 : German survey on EGSS

Annex 12. The double-counting problem

The delimitations of the EGSS scope to include only main producers reduce the risk of double counting and an overestimation of the EGSS' turnover and employment issued from the suppliers and distributors.

However, among main producers, it is still possible to have double counting as some environmental technologies, goods or services can be used in the production of another environmental output. Considering both activities could lead to an overestimation of the size of the environmental sector. Therefore, in order to avoid double counting between output (and subsequent uses) and intermediate consumption, some precautions must be taken.

According to SERIEE, the intermediate consumption of EGSS' technologies and products carried out by EGSS producers should be calculated and deducted for the quantification of the turnover. This implies to quantify the intermediate consumption of EGSS' technologies and products.

However, in the case of producers who execute environmental activities as secondary, it is impossible to estimate (without specific inquiry) what part of the unit's intermediate consumption in specific products has been used for the environmental secondary activity. As secondary activities are generally of minor importance, one can assume that the whole intermediate consumption of specific products is related to the principal non-environmental activity. When the producer unit at the same time undertakes an ancillary activity, the same precautions as described below should be taken.

When the non-specialised producer executes an environmental activity as ancillary, valuation of this ancillary output could result from a specific inquiry. One might choose either to incorporate the corresponding part of intermediate consumption of specific products in the value of the ancillary output or not. This first solution would require a much more detailed questionnaire (e.g. the identification of that part of the waste or wastewater services purchased which is used for characteristic activities). Therefore, for simplicity reasons, it is assumed that all intermediate consumption of environmental services is related to the principal activity.

This assumption avoids double counting and requires the identification of intermediate consumption of characteristic services only for producers as a whole. However, whereas the total uses of the producer units and, consequently, the corresponding parts of national expenditure are correctly assessed, the ancillary output is under-recorded in the sense that intermediate deliveries of characteristic services among characteristic producers are netted out.

If double counting is to be avoided, intermediate consumption must be excluded100. But this means to be able to retrieve these data, which is not always easy to do.

Intermediate consumption is not considered in each case within the EGSS analysis. Depending of who consumes and who offers the product, the intermediate consumption should be excluded or not from the environmental turnover.

The table below resumes the different types of intermediate consumption that exist.

[100] Gross fixed capital formation should be excluded as well only if the figure GFCF of EGSS had to calculated; but such a figure is not included among the variable to be quantified for the EGSS

	NON EGSS	EGSS
NON EGSS		IC1
EGSS	//	IC2

Table A12.1 : Types of intermediate consumption included and excluded in the EGSS (IC)

- The consumption of non-EGSS products by the non-EGSS producers is not considered in the EGSS analysis.

- The consumption of EGSS products by the non-EGSS producers can be taken into account when the demand-side approach is followed.

- The consumption of non-EGSS products by the EGSS producers is Intermediate Consumption of type 1 (IC1). EGSS producers purchase products other than EGSS products, i.e. multi-end products. The suppliers of these multi-end products are currently excluded.

An estimate of the size of the supply of the multi-end products can be obtained by calculating the intermediate consumption of the EGSS producers that consists of purchases of products other than EGSS products, i.e. IC1.

IC1 can be calculated as the difference between the total intermediate consumption of EGSS producers (ICT) and the intermediate consumption of EGSS products (IC2), that must be calculated and deducted for the quantification of the turnover in order to avoid double counting (see below). This implies to quantify another variable for the EGSS producers, i.e. total intermediate consumption (ICT = IC1 + IC2).

- The consumption of EGSS products by the EGSS producers is Intermediate Consumption of type 2 (IC2). EGSS producers can purchase EGSS products from other EGSS producers. Such intermediate consumption (IC2) should be calculated and deducted *for the quantification of the turnover* in order to avoid double counting (this is consistent with the SERIEE accounting principles and rules). This implies to quantify another variable for the EGSS producers, i.e. IC2, in addition to those considered so far (turnover, value added, employment, exports).

In table B and B1 of EPEA, consumption of adapted and connected products (by characteristic producers) is also found. The EPEA, as well as the RUMEA in the future, provides these intermediate consumption figures for a sub-group of the EGSS producers, i.e. specialised producers of environmental services.

As a matter of fact Table B provides:

- ICT = total intermediate consumption

- IC2 = intermediate consumption of EP (or RM) services and adapted and connected products

- IC1 = ICT – IC2

Annex 13. Countries' examples

This Annex contains examples on the estimation of EGSS turnover, value added, employment and exports from countries which have undergone studies of the sector (Austria, Belgium, Canada, France, Germany, Hungary, the Netherlands and Sweden).

Each country applies one of the two proposed methods for data compilation (i.e. existing registers/statistics or surveys). Three countries use registers (Belgium, The Netherlands and Sweden), two others use surveys (Germany and Hungary) and two combine both approaches (Canada and Austria). France uses the demand side approach.

Each country uses its own methodology. Definitions and classifications of the sector used by the countries are different and not always in line with those presented in this Handbook.

Turnover

The Netherlands

Data on turnover strictly speaking are not collected. Turnover is approximated by data on production. Stocks of goods are thus taken into account.

According to the National Accounts (2003), production covers the value of all goods produced for sale, including unsold goods, and all receipts for services rendered. Production furthermore covers the market equivalent of goods and services produced for own use. Production is valued at basic prices, defined as the price received by the producer excluding trade and transport margins and the balance of taxes and subsidies on products. This is the price the producer is ultimately left with.

Statistics Netherlands combines supply-side information (via existing registers and statistics) and other existing data sources (demand-side information, trade associations, yellow pages, etc.).

Using supply-side information has the advantage to cover private and public enterprises. Several other approaches are needed to examine more deeply the environmental related turnover of secondary and ancillary activities, of environmentally related technologies and advices and of cleaner products and equipments.

The most important source used for the core industry (sectors considered entirely environmental) is the National Accounts, which provide directly aggregate statistics. In addition, IAGT information[101] on production is disaggregated using the distribution among sub-classes of NACE codes and environmental domains available at the Environment Statistics.

For the non-core industry, the most important source of data is the Business Register. Several other registers have been used to construct a database of companies involved in environmental related consultancy and engineering. For this sector of producers, turnover is approximated using the assumption that these variables are proportionally related to the employment numbers.

For the government, turnover is estimated by the costs. Statistics Netherlands considers the total environmental related costs as the internal turnover generated by the ancillary activities. Information on environmental costs is available via the Environmental Statistics department.

[101] IAGT stands for "integrated system of supply and use tables".

Sweden

Statistics Sweden uses a supply-side method to estimate turnover of EGSS. The collection of data focuses thus on the supply of goods and services for environmental protection and Resources Management. The turnover is collected by NACE, by environmental domain, by regions and territorial statistical units. The sources used by Statistics Sweden are the VAT Register for “small companies” and Business Register and Annual Reports for larger companies.

Since the entire turnover is counted for the non-core environmental sector, even if only a part of this sector can be related to environmental activities, the real turnover of EGSS activities is said to be in the interval between the core environmental sector and the sum of the core and non-core sectors. However, as there is a need for better estimating total values, attempts to develop better methods have been made.

For some domains, such as renewable energy, there is a need for more precise estimations. Energy, power plants produce heat or electricity from different kinds of fuels. A plant using a share of 49% renewable fuels will be classified in the same secondary group as a plant using only a 2% share. When using the two classification groups (core and non-core) and, even though they contribute differently in the environmental sector, the employed people and turnover will be added together equally when publishing results for the secondary sector.

A better estimate would be obtained, in this case, by multiplying the share of the actual renewable energy produced by, for example, the turnover of these establishments. This is mainly relevant for the non-core sector since it is assumed that an establishment with over 50% environmental production is an “environmental” establishment no matter if the share is 55% or 100%.

A study has been done in order to see if it was possible to use more detailed information from Energy Statistics to improve the statistics for the non-core classification in the database. Information from Energy Statistics could supplement the classification of secondary establishments with information on shares in some forms of the renewable energy actually produced. This could be done either with the precise share of each plant or with a less specific share indicating the share of renewable energy produced by a certain group of producers.

Some factors lead to some uncertainty. The used Energy Statistics have a delay of more than one year which means that old information is used and that, for example, information can concern an establishment that no longer existed. In some cases, rough estimations and guesswork are also needed. The differences between the Business Register and Energy Statistics will always lead to the need for some estimation. In effect, the business register base their statistics on different unique identification numbers and unfortunately a plant in Energy Statistics does not always correspond to an establishment in the Business Register. Some estimation is to be made when the registers cannot be matched.

This input of information on shares can be found also for other activities, not only renewable energy production.

Belgium

Belgium has chosen to work according to a supply-side approach, based on the production data of environmental goods and services providers for principal and secondary activities, combined with demand-side data for ancillary activities.

The supply side approach focuses on getting information on the availability of environmental goods and services. The tool used most often to obtain this kind of information is a survey of the producers. However, a major guideline of environmental accounting is to use the data that is already available.

Useful data on companies with environmental activities in Belgium were found in the Structural Business Survey, the balance sheet made by the National Bank of Belgium as well as the National Accounts.

The demand-side approach is characterised by the collection of information on the demand for goods and services for environmental protection. Data were taken from the Belgian Environmental Protection Expenditure Accounts (for the period 1997-2002). This data was used to estimate turnover on ancillary activities.

Belgium has collected data on production, employment, size and NACE category of the enterprises identified as part of the environmental sector.

To assess the Belgian environmental sector, a database was created containing enterprises that perform environmental activities. Private as well as public organisations were incorporated. Large firms and self-employed or non-profit institutions were also included. The coverage of the spectrum of organisations belonging to the environmental sector was thus expected to be quite complete. Nevertheless, as the coverage is limited, due to the fact that only VAT-contributors were integrated, parts of general government or non-market activities were probably missing.

As soon as any output activity in the environmental field was registered for a specific company, this company was added to the database. The only distinction made is between the principal (more than 50% of their activities are environmental) and secondary activities (less than 50% of their activities are environmental).

Turnover was used as a proxy of production. As the Belgian environmental sector is dominated by services providers, the difference due to stocks changes and traded goods was not significant.

Production data for the specialised producers (undertaking activities 100% environmental) were extracted from the database of the Central Balance Sheet Office and completed with production data based on tax registers. For primary producers, total output data were taken into account.

For secondary producers, detailed production data were issued from the Structural Business Survey and were confronted with a list of products that can be considered to be environmental goods or services. This list was based on PRODCOM codes and the 1999 OECD manual and adapted to the Belgian context.

As the entire spectrum of secondary producers was not covered, the average share of environmental production to total production was determined for each NACE category. Then these shares were applied to the total production of all firms identified as secondary producers in each of the respective NACE categories. It was thus assumed that enterprises pertaining to a same NACE class had the same share of environmental activities. It was also assumed that goods listed are 100% environmental.

An estimation of the production of environmental goods and services produced as an ancillary activity was made using the environmental protection expenditure accounts. The data on ancillary activities in these accounts was obtained from the enterprises by means of a survey by Statistics Belgium.

Austria

Statistics Austria collects data on turnover of EGSS from SBS and other statistics publications.

A breakdown by NACE classes is not foreseen for the moment, data is only available by environmental domains. The reason is that some data are obtained via the subsidies and promotions for environmental investments that are not detailed by NACE classes.

Statistics Austria uses thus a supply-side methodology and selects the population by identifying the producers of a certain environmental goods and services. The method used to identify establishments and collect data differs from one environmental domain to another, depending on the sources of data available. Some examples are:

Statistics Austria considers that organic farmers are producers of cleaner technologies in the sustainable agriculture domain. Sustainable agriculture is thus defined as organic farming that is the "*most environmentally compatible form of agriculture, with the lowest possible use of external energy sources, utilisation of natural self-regulating mechanisms, nourishment of soil instead of the plants, fullest farming cycles possible and protection of environmental resources (such as soil and water)*"[102]. Data for this domain come from AMA that is an organism that gives subsidies for agricultural exploitations investments. AMA has a list of subsidies and corresponding investments. Cleaner products in the sustainable agriculture domain are biological foods, mainly biological milk. The turnover of the sector is assumed to be the amount of households' consumption of biological foods. For this kind of goods a demand-side approach is thus used.

Other cleaner products are found using PRODCOM codes and data are obtained with the Short Term Statistics available at Statistics Austria.

In the Resources Management group, sustainable forestry is defined as proposed in the Second Ministerial Conference on the Protection of Forests in Europe, held in Helsinki in 1993. *"The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality, and their potential to fulfil, now and in the future, relevant ecological, economic, and social functions at local, national and global levels, and that does not cause damage to other ecosystems."*

The 6 criteria are:

a. Forest resources – Conservation and appropriate improvement of forest resources and their contribution to global carbon cycles.

b. Health and vitality – Maintenance of the health and vitality of forest ecosystems.

c. Productive functions of forests – Maintenance and strengthening of the productive functions of forests (wood and non-wood products).

d. Biodiversity – Safeguarding, protection and appropriate enhancement of the biological diversity of forest ecosystems.

e. Protective functions – Maintenance and appropriate enhancement of the protective functions in forest management (in particular soil and water).

f. Socio-economic functions – Safeguarding of other socio-economic functions and conditions.

Data in this domain are obtained by database regrouping establishments that have received some environmental subsidies.

Data for renewable energy domain is estimated from the energy balances. To do so, Austria multiplies the amount of energy produced by the price to have the turnover of the sector.

[102] www.lebensministerium.at

For the recycling domain, data come from annual reports and surveys. Data are obtained for the recycled papers and other stuffs. The value of recovered paper is calculated on the basis of information about the amount of recovered paper and the price per ton (price information obtained from a recycling corporation) and on the basis of information from the association of Austrian paper industry.

For the water supply domain, data are obtained by database regrouping establishments that have received some environmental subsidies. Activities of potabilisation of water, distribution and purification of water are separated. Costs for drinking water treatment are collected from municipalities.

For emissions monitoring, Austria considers the number of road disc for CO_2 emissions multiplied by their price in order to have the turnover of the sector.

In the noise domain, Austria considers the anti-noise walls erected along highways. The construction price per kilometre is multiplied by the number of kilometres to have the turnover of the sector.

For environmental research and development, data are obtained from annual reports and Short Term Statistics.

Some branches are calculated with factors (environmental share) based on a study on environmental consulting and on experts' opinion. The basic data come from the SBS. The factors calculated are, following the NACE Rev.1 classifications of activities:

- 37.10: recycling of metal waste and scrap (100% of the production value)
- 37.20: recycling on non-metal waste and scrap (70%)
- 45.11: demolition and wrecking of buildings (75%)
- 45.32: insulation work activities (100%)
- 51.57: wholesale of waste and scrap (15%)
- 73.10: research and experimental development on natural sciences and engineering (3,8%)
- 73.20: research and experimental development on social sciences and humanities (3,8%)
- 74.11: legal activities (3,8%)
- 74.14: business and management consultancy activities (3,8%)
- 74.20: architectural and engineering activities and related technical consultancy (3,8%)
- 74.30: technical testing and analysis (3,8%)
- 92.53: botanical and zoological gardens and nature reserves activities (100%)

Employment

Austria

Statistics Austria uses an estimation method in the case of the variable employment. However, estimations are only done for the corporations non-entirely environmental. For the corporations entirely environmental, data are compiled using in the Short Term Statistics and SBS.

Thus, for the non-entirely environmental corporations, Statistics Austria takes the productivity of the specialised corporations and applies them to the production in order to catch the employment. Statistics Austria makes the assumption that environmental employees in the non-specialised corporations have the same productivity than in the specialised ones.

Belgium

Belgium has chosen to work according to a supply-side approach, based on the production data of environmental goods and services providers for principal and secondary activities. There is a difference in the method and sources of economic data for primary sector and secondary producers.

Data on employment for the primary producers (more than 50% of the production is environmental) are extracted directly from official databases. For specialised producers (100% environmental), total employment is used.

For secondary producers (less than 50% of the production is environmental), detailed production data are issued from the Structural Business Survey and are confronted with a list of products that can be considered to be environmental goods or services. This list is based on CPA codes and the 1999 OECD manual and adapted to the Belgian context.

As this survey does not cover the entire spectrum of secondary producers, the average share of environmental production to total production was determined for each NACE category. The share of employees conducting environmental activities is assumed to be the same share of environmental production in total production for each of the different NACE categories.

It is also assumed that enterprises pertaining to a same NACE class have the same share of environmental activities and that goods listed are 100% environmental.

No data on employment for ancillary activities was available. In many cases, ancillary production is probably also carried out by employees performing non-environmental activities in the same firm.

France

IFEN defines environmental jobs as jobs filled in organisations for which the environment represents their main activity. But another definition is also used: jobs which have been or are created by taking into account of the environment in economic activities in general (market activities or not). This definition is extremely broad, since it includes all jobs created indirectly, including those created by redistribution of income.

The perimeter of the evaluation of the employment is defined by the environment related expenditures. These expenditures by activity are broken up into different products. Among these products are specific equipments such as incinerators or connected products such as dustbins.

Each product is then associated to a production that is divided in a national production and an imported production. The national production, even if it is for the export, generates employment, on the contrary of the imported production. The imports are therefore deducted from the total of the production. Inversely, export, thus the foreign demand that create jobs but do not generate expenditures, is added.

To these various types of production, the ratio number of persons employed/turnover exclusive of tax for the sector or sectors of activity in question is applied in order to evaluate the corresponding number of jobs. This ratio is taken from the annual business surveys for well-identified activities or national accounts for some aggregated groups of products. For the provisional estimate of the latest year under review, the ratios by sector are not generally known. They are this estimated from the ratios for the previous year and the provisional trend estimated in the National Accounts for the corresponding branches.

The hypotheses are thus relatively strong:

- The ratio is an average ratio for an entire goods or services category;

- For some category of goods, the ratios are more general. For example, the average ratio for “professional goods of equipment” is also used for the category “other equipments”;

- A same ratio is used for the same environmental service, if it is carried out by a private enterprise, by a public producer or as an ancillary activity in an enterprise.

Since these estimates and ratios come at the end of the chain of the data collection, they are also affected by the quality of the entire cascade estimates made previously (particularly the problem of identifying environmental goods and facilities in product nomenclatures).

IFEN concludes that environmental employment estimations from national expenditures remain imperfects.

The Netherlands

The definition of employment used by Statistics Netherlands stems from National Accounts (2003). The volume of employment covers “all hours by all persons dedicated to producing goods and services”. It is expressed in full time equivalent jobs.

For employees, a full time equivalent job is the quotient of the annual contractual hours of the job and the annual contractual full time hours considered full time in that branch of corporation.

For self-employed, a full time equivalent job is the quotient of the usual weekly hours of that job and the average weekly hours of self-employed with 37 or more normal weekly hours in the same branch of corporation.

The employment of entirely environmental sector is the easiest to access. Data are obtained via existing statistics according to the NACE classifications.

For the other corporations carrying out environmental activities as their principal activity, Labour Statistics can provide directly data if their activities are separately recorded in a NACE category (such as environmental monitoring and analysis (NACE 74303)). Otherwise, the same method than for corporations carrying out environmental activities as their secondary activity is applied.

For other corporations whose activities are not separately recorded in a NACE category, a list has been constructed according to the yellow pages and with this list, the NACE code of reference was found. Then, the business register gives the information.

For ancillary activities, employment numbers are estimated using information based on the survey on environmental costs and expenditures (Department of Environmental Statistics). The method used varies depending on the environmental domain.

For environmental related coordination activities, the employment number can be derived directly from the statistics.

For the environmentally related R&D, the employment number is derived using information on the costs on R&D (that are assumed to consist only on labour costs) as these costs are divided by the yearly wage of an employee in the R&D sector.

For other domains, such as wastewater management, air pollution control, soil remediation, waste management, noise and vibration management, information on the current costs are available. Statistics Netherlands has calculated the costs per employee per environmental domain in the environmental services sector. As it is assumed that production structure for ancillary activities is the same than in the environmental services sector, the employment numbers are calculated by dividing the current costs by the costs per employee in the domain concerned in the environmental services sector.

For the government, the employment number for operational activities (such as waste collection or wastewater treatment) is equal to the personal costs divided by the average wage in the environmental services sector. Average wages are obtained via the National Accounts.

Sweden

For the employment variable, data is compiled via the Labour Statistics, based on administrative sources (RAMS). Labour statistics are based on establishments, like the environmental sector database, so it is easy to connect the two information sources in order to produce statistics. Sweden is interested to get data by NACE sector, by environmental domain, by regions and territorial statistical units and by type (public or private) of producers.

Labour statistics are used in order to link information about the number of *employed men and women*, for example, *education levels and salary* to the environmental sector database. RAMS offers annual information on employment, commuters, employees and industrial structures and also illustrates occurrences and flows in the labour market.

The statistics are based on total population surveys and can be broken down into smaller regional areas. RAMS allows data to be presented in great detail. Flows in the labour market can also be reported. The statistics are produced annually and are presented approximately 13 months after the measured period (in November) each year.

Since all employed people are counted for the secondary sector (undertaking activities less than 50% environmental), even if only a part can be related to environmental activities, the real employed people is said to be in the interval between the primary sector (undertaking activities more than 50% environmental) and the primary and secondary sectors together. However, as there is a need for better estimate total values, attempts to develop better methods have been made.

Canada

Statistics Canada makes a survey on the environmental sector (the Environment Industry Survey, Business Sector (EIS)[103]). It is a census of all establishments operating in Canada that were involved either in whole or in part in the production of environmental goods, the provision of environmental services and the undertaking of environment-related construction activities.

The EIS currently collects data on total revenues, environmental revenues, specific types of environmental activities and environmental export revenues by region. Additional information on environmental revenues by type of clients and by customer location is also collected.

Concerning the employment, an additional question has been recently included in the EIS. A best estimation of the proportion of environmental employment is asked.

First estimation method: the aggregate-level ratios

Given the absence of published environmental employment data based on direct survey results, most analysts use aggregate-level ratios in order to estimate the corporation's environment-related employment. These aggregate-level ratios are computed using the data from the EIS report.

The ratio used is the one of the environmental revenues to total revenues at the corporation group level. This ratio is then applied to the total employment.

Second estimation method: the firm-level ratios

One alternative to aggregate-level ratio is the use of firm-level ratios. This approach aims to minimize the influence of the top contributors in the calculation of the ratio of environmental revenues to total revenue for each corporation group.

Then, for each establishment, the ratio "environmental revenues to total revenues" is calculated. This ratio is applied to the establishment's total employment in order to obtain an estimate of environmental employment. These establishment-based results are then used to produce aggregate-level results by corporation group.

Third estimation method: the concordance list based on Input-Output classification

Greatly expanded structural details on corporations and on goods and services is portrayed in the Input-Output Tables of the System of National Accounts in Canada.

A concordance list of environmental goods and services from the EIS and the list of commodities based on the Standard Classification of Goods (SCG[104]) is established.

A second concordance list, that matches the SCG-based list of environmental goods and services and the list of Input-Output commodities, is then established. The Input-Output corporations that have environmental activities could therefore be identified.

The revenues shares of environmental activities are calculated for each corporation based on the results of the EIS. The environmental revenues shares could be used as proxies to estimate the

[103] http://www.statcan.ca/english/freepub/16F0008XIE/16F0008XIE2002001.pdf

[104] The Standard Classification of Goods (SCG) is the standard for classifying goods at Statistics Canada. The SCG is based upon the international Harmonized Commodity Description and Coding System (HS), which makes up the first six digits of the SCG code. http://www.statcan.ca/english/Subjects/Standard/scg/scg-index.htm

proportion of total employees who work directly or indirectly in the production of environmental goods or in the provision of environmental services. The shares are applied to the overall corporation employment in order to produce estimates of environmental employment by corporation.

The method, inspired by the Canadian example but applied to the European context, follows some stages:

The first stage is to identify environmental technologies, goods and services in a product classification such as the Harmonised Commodity Description and Coding System (HS).

This list of environmental goods and services is then put in concordance with a classification of products by activity used in the Input-Output analyses, such as the Statistical Classification of Products by Activity (CPA). This stage permits to identify the Input-Output corporations that carry out environmental activities.

Sector	Aggregate level	Firm level	Direct survey response
1 Agriculture, forestry, fishing and hunting	163	267	364
2 Mining and oil and gas extraction	X	X	X
3 Utilities	1863	167	2907
4 Construction	16850	16071	3412
5 Chemical manufacturing	701	896	459
6 Plastic and rubber products manufacturing	3408	2853	1615
7 Non-metallic mineral product manufacturing	578	566	744
8 Primary metal manufacturing	592	748	1024
9 Fabricated metal product manufacturing	1386	1354	831
10 Machinery manufacturing	3804	3717	2997
11 Computer and electronic product manufacturing	679	822	1536
12 Electrical equipment, appliance and component manufacturing	882	776	64
13 Rest of manufacturing sector	851	946	455
14 Wholesale trade	14188	14232	7489
15 Retail trade	279	405	464
16 Finance and insurance services	172	192	244
17 Legal services	406	661	204
18 Architectural and landscape architectural services	307	284	117
19 Engineering services	15937	14465	10544
20 Surveying and mapping (including geophysical) services	168	228	228
21 Testing laboratories	1199	1292	1078
22 Computer systems design and related services	385	529	485
23 Management, scientific and technical consulting services	3995	3991	4029
24 Scientific research and development services	605	726	431
25 All other professional, scientific and technical services	537	600	661
26 Management of companies and enterprises	1071	947	1994
27 Administrative and support services	812	945	480
28 Waste management and remediation services	20721	20681	16319
29 Other services	X	X	X
All sectors	**95041**	**90883**	**49968**

Table A13.1 : Canada, employment in the environmental industry, comparison between results according to the different Canadian methods (source: Statistics Canada 2004)

These two first steps are parts of the procedure explained in Chapter 3 to find the population of the EGSS.

The revenues shares of environment-related activities for each corporation identified in the previous stage are calculated via, for example, the Structural Business Statistics Survey or other industrial survey. This share is the ratio of the revenues due to the production of the environmental products identified in the first step to the total revenues of the corporation.

These revenues shares are used as proxies to estimate the proportion of total employees who work directly or indirectly in the production of environmental goods or services. The shares are in effect applied to the overall corporation employment in order to obtain estimates of environmental employment by corporation.

As Statistics Canada has shown, the number of employment estimated depends on the data collection method. Canada estimated employment figures for the EGSS using these three methods (i.e. the methods of estimation with ratio at aggregate-level, at the firm level and with direct response survey) in order to test and compare them. As shown in the table bellow, differences can be very important.

Exports

A certain number of Members Countries have been very active in studying the EGSS. Unfortunately trade of the environmental sector has not received the same attention as other variables, i.e. turnover and employment. Nonetheless some of this work contains elements useful to find out and assess methodologies and sources for EGSS exports statistics.

Among these countries, Sweden and the Netherlands have analysed exports in depth. Germany regularly surveys the turnover achieved with foreign customers by its eco-industries. Moreover, an assessment of trade in environmental goods was undertaken for all EU Member States by ECOTEC[105] in 2002. Their results are discussed in detail.

Among the other countries that underwent studies on the EGSS, it is worthwhile to remember Austria and Belgium experiences.

Statistics Austria carried out a preliminary survey on environmental services corporations. This survey also contained questions about exports. Unfortunately the results did not allow a calculation of these exports. Thus, Statistics Austria does not foresee to survey export data again in the future.

Belgium statistical office produced a detailed study of the EGSS[106]. Even if it does not report any data on exports of EGSS, it produced a list of environmental goods and services, classified according to the CPA nomenclature, which could be of valuable help also in investigating exports.

Next paragraphs present some country examples.

The Netherlands

Data on exports are only fulfilled with respect to some parts of the EGSS (i.e. that part of the corporation named “core”: activities that can be readily identified under the NACE headings as entirely environmental, e.g. NACE ver. 1.1 38, material recovery).

Exports are defined as goods that have been exported by residents from the Dutch economic territory to the rest of the world. The exports of services include the services of Dutch transport enterprises abroad, harbour services, ship repairs services and engineering of works by Dutch contractors abroad.

[105] ECOTEC, Analysis of the EU Eco-Industries, their Employment and Export Potential, 2002
[106] FPB, The Belgian Environment Industry (1995-2005), 2007

Also included in the exports of services are expenditures by foreign tourists, inhabitants of the border area and diplomats in the Netherlands.

The business registers and trade registers cannot be linked. Thus exports are estimated using the Input-Output table of 2003. This method can provide exports only for entire NACE classes. For this reason data on exports are only provided with respect to the NACE rev. 2, 38.

This methodology can be applied to the rest of the EGSS too. However, information on environmental shares of each NACE class is not available and it would be very difficult to evaluate. Thus, any figure from the application of this method to sectors that are not 100% environmental would definitely overestimate the EGSS exports.

To solve this problem, Statistics Netherlands tried also to use a different approach. Starting from an environmental product list (e.g. the list contained in the Environmental industry OECD/Eurostat Manual), environmental products are linked to companies. Then data from registers that contains data by products codes (e.g. PRODCOM classification) is linked to each company. In this way particular environmental statistics related to products can be directed towards a particular NACE class. This approach has been tested for turnover and employment but Statistics Netherlands concludes that the estimates based on the PRODCOM database are too unreliable for various reasons: e.g. they do not include some sectors as the construction sector; many of the products are multi-end products and there is no reliable information on the environmental shares of the environmental products.

Sweden

In Sweden, there are two different registers containing data on exports: the Foreign Trade Statistics (FTS) and the VAT-Register. FTS contains only goods, collected partly by surveys, partly from data originated from the Swedish customs. The export data in the VAT-Register is calculated from the reported VAT from companies and this is then assumed to contain both goods and services. Exports estimation is done according to the same method than domestic turnover.

Every establishment is connected to a company through its unique identification number. By the identification number of the company – the organisation number – it is possible to link the Swedish database to the different registers containing data on exports and thereby obtain information for each company. The data are then distributed from company level to establishment level by constructing weights. To estimate the weights, two different methods are used.

The first method is to construct a weight by dividing the number of employed people at the establishment with the total number of employed people in the company. This is the most commonly used method.

When it comes to companies with a large number of establishments where there are few or no employees, as in most energy companies, this method is not suitable. In these cases another method is used. Instead of employees, it is the number of establishments that is used and exports are distributed in equal parts to each of the establishments.

Using one of these two methods, a weight for each establishment is estimated. To make the distribution, the weight is then simply multiplied with the company level exports.

This methodology allows Statistics Sweden to obtain statistics on exports for its entire environmental sector. Nevertheless some questions raise on whether all exports incomes are truly environmental. For this reason, Statistics Sweden has also investigated the possibility of estimating the exports of the sector from a product perspective.

To do so, the first step Sweden has undertaken is to go into details in the 8-digits Combined Nomenclature (CN) codes, which is the most detailed level available.

Two methods were applied to handle the material.

The first method consisted in linking the trade register to the environmental database. The foreign Trade Register keeps record of CN codes, the company's organisation number and the value of transaction. In this way, Statistics Sweden could find out which companies have an export income and for which kind of goods, in terms of the CN codes.

For this purpose, the environmental sector database was aggregated from the establishments' level into companies' level to be able to keep track of the organisation number as the Foreign Trade Statistics collect data only on company level.

The first problem arose with the amount of material to handle with, as roughly 1000 environmental companies are exporting goods covering nearly 2600 CN codes scattered all over the classification system.

The solution found was to aggregate on a higher level of CN codes in order to find "hotspots" to be further analysed using the 8-digits level of CN codes.

This method relies on the assumption that there already exists a population of identified environmental companies, such as the Swedish environmental sector database.

The second method was to link the trade register to existing lists of supposed environmental goods. This method uses a product perspective in terms of exploring already existing lists of supposed environmental goods, namely OECD list and an APEC list. Both lists are based on identified Harmonised System (HS) codes at 6-digits level.

Some of the companies exporting the goods of the OECD and APEC lists are often large companies with diverse activities and with main activities outside the definition of the environmental sector. In Sweden, these companies would have been left outside the environmental sector database. Consequently, the products/goods perspective opens up an opportunity to include these companies in the database regardless of their main activities and without fear of inflating figures.

In fact, the product approach allows calculating share of their activities that fall inside the definition of environmental sector. One way to calculate this share is to use the total sum of exports that fall within the lists of environmental goods divided by the sum of total exports recorded for the specific company.

Among the objection to the use of a pure products/goods perspective, Statistic Sweden stressed the fact that an important part of the environmental sector is lost, namely the services, as only goods are included in the HS codes. Using the VAT register to estimate services was thought as a complementary tool.

Germany

Since 1996 Germany surveys the main producers of environmental goods and services. This survey is organised in a decentralised way in the sense that the Federal Statistics Office (FSO) is responsible for harmonising methods and producing the questionnaires and publications while the 16 statistical offices of the Länder do the practical part of the survey (i.e. looking for the units to which to address the survey, collecting and validating data).

For Germany, the environmental protection refers to goods, construction operations and services serving the purpose of emission reduction.

Emission reduction is the avoidance, reduction or removal of damaging influences on the environment caused by production and consumption. German survey refers to the environmental areas of “waste management”, “water protection”, “noise abatement”, “air quality control”, “nature and landscape conservation”, “soil decontamination” and “climate protection”. Not included are goods, construction operations and services for safety at work.

The turnover indicated by producers does not include the turnover achieved by sub-contractors or other non-environmental products. The turnover is asked to be detailed by environmental product.

All relevant producers have to report about their turnover generated by each environmental product or service, the part achieved with domestic customers and the part with foreign customers. Thus, the German survey gives the possibility to have exports data.

To make easier for the Länder to find the population of producers of environmental goods and services, and for companies to fill in the questionnaire, the central statistical office has prepared a list of environmental goods and services that is updated every year.

This list has been established by the central Statistics Office, in consultation with industrial associations and universities.

The products are sub-divided in 3 categories: environmental goods, environmental services and construction works, thus in accordance with the manual on EGSS OECD/Eurostat (1999). Each product has a code with 5 numbers. The first number indicates the categories (goods, services and construction works). They are then distinguished according to the principal material composing the products, and this constitutes the second number. For example, in the case of goods, 0 is for textile, 1 is for wood, etc. The third number is the environmental domain. The environmental domain is attributed to a product according to the 1999 OECD/Eurostat manual but also using the SERIEE approach. The last two numbers are linked to the kind of activity (planning, measuring, process control, etc.).

The results of the survey are published every year, the latest report available is that of 2007 referring to the results of the survey conducted in 2005[107].

Exports are reported by country of destination (EU, not EU), by type of good and service and construction. Exports are also reported by corporation sector using the German classification of branches of Corporations (2003 edition) that can be easily translated in the corresponding NACE codes (at 3 digits-level of detail).

ECOTEC (2002) and Ernst and Young (2006)

In addition to the collection of data on environmental expenditure, an assessment of trade in environmental goods was undertaken for all EU Member States by ECOTEC in 2002[108] and Ernst and Young in 2006[109]. The analysis focused on key goods for which trade data was available. The trade codes used are shown in Table A13.2 below.

[107] DESTATIS, Umsatz mit Waren, Bau- und Diensteleistungen, die ausschließlich dem Umweltschutz dienen 2005, Statistisches bundesamt, Wiesbaden, 2007

[108] ECOTEC, Analysis of the EU Eco-Industries, their Employment and Export Potential, 2002

[109] http://ec.europa.eu/environment/enveco/industry_employment/pdf/ecoindustry2006.pdf

Env. Domain[1]	Product	Trade Code
Air Pollution Control	Machinery and apparatus for filtering and purifying air.	8421.39-30
	Machinery and apparatus for filtering and purifying gases (excluding air) by a liquid process.	8421.39-51
	Machinery and apparatus for filtering and purifying gases (excluding air) by an electrostatic process	8421.39-55
	Machinery and apparatus for filtering and purifying gases (excluding air) by a catalytic process	8421.39-71
	Machinery and apparatus for filtering and purifying gases (excluding air) (by other processes) (excluding 8421 39-51 to 75)	8421.39-99
Water Pollution Control	Machinery and apparatus for filtering and purifying other liquids	8421.29-90
	Activated carbon	3802.10-00
	Centrifugal Pumps - submersible, single stage	8413.70-21
Waste Disposal	Furnaces and ovens for the incineration of rubbish (non electric)	8417.80-10
	Parts of industrial laboratory furnaces and ovens	8417.90-00
Monitoring Equipment	Instrumentation for measuring and analysing liquids	9026.80-91 9026.80-99
	Gas or smoke analysis apparatus (electronic)	9027.10-10
	Gas or smoke analysis apparatus (non-electronic)	9027.10-90
Other Environmental Equipment	Parts of machinery for filtering and purifying gases and liquids	8421.99-00
	Other industrial and laboratory furnaces, (non-electric)	8417.80-90
[1] following the Environmental industry OECD/Eurostat manual Source: ECOTEC, 2002		

Table A13.2 : Trade Codes used for the Analysis of Environmental Technologies by ECOTEC, 2002

It is unclear what percentage of total trade in environmental goods is captured by these trade codes. Due to data limitations, it is only possible for a few countries (usually strong exporters) to make a comparison between exports measured by trade code analysis with exports reported by environment sector suppliers. This comparison suggests that only in the order of 20% of total trade is captured by trade codes in these countries. However, this ratio is highly variable across environmental categories. The limited evidence suggests that for air pollution control it is more like 50%, but for wastewater treatment and waste management it is likely to be less than 20%. Moreover, the ratios are also likely to vary across countries.

The EU trade data used was derived from Eurostat's COMEXT database[110], using a time series from 1994 to 1999. External trade statistics only cover transactions in transportable goods, not services. Analysis was concentrated on extra-European trade, with particular emphasis on examining trade flows between the EU-15 and Candidate Countries. Trade balances for each EU Member State were also calculated.

[110] COMEXT is the database for statistics on the European Union's external trade for Member States.